

013040

JPRS 82311

24 November 1982

# USSR Report

LIFE SCIENCES

BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 25

DISTRIBUTION STATEMENT A  
Approved for Public Release  
Distribution Unlimited



19990624 044

**FBIS**

FOREIGN BROADCAST INFORMATION SERVICE

REPRODUCED BY  
NATIONAL TECHNICAL  
INFORMATION SERVICE  
U.S. DEPARTMENT OF COMMERCE  
SPRINGFIELD, VA. 22161

7  
79  
A45  
DTIC QUALITY INSPECTED 4

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

24 November 1982

USSR REPORT  
LIFE SCIENCES  
BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 25

## CONTENTS

## AEROSPACE MEDICINE

Modeling in Investigation of Aviation Accidents.....	1
Retrospective Evaluation of Condition and Behavior of Flight Crews in Aviation Accidents.....	1

## BIOCHEMISTRY

Olfaction in Defense Response of Grass Carp Ctenopharyngodon Idella (Val.) (Cyprinidae) to Alarm Pheromone.....	2
Alarm Pheromone as Stress Factor for Fish.....	2

## EPIDEMIOLOGY

Prevention and Treatment of Skin Leishmaniasis.....	3
Tularemia Susceptibility of Eastern Siberian and Sakhalin Voles.....	6

## GENETICS

New Cultivars.....	7
Update on Molecular Genetics--RNA Polymerase.....	9

## MEDICINE

Ultrasound Used To Treat Eyes.....	13
Microsurgery--Update.....	15

Effects of Chronic Alcohol Intoxication on Temporal Parameters of 'Motor Command' Organization and Interhemispheric Relationships in Humans.....	18
--------------------------------------------------------------------------------------------------------------------------------------------------------	----

#### MICROBIOLOGY

Role of CO-Binding Cytochrome C in Enzymatic Oxidation of Methane by Methylococcus Capsulatus.....	19
Composition and Substrate Specificity of Fibrinolytic Preparation From the Fungus Flammulina Velutipes.....	20
Effects of R Factors on DNA Concentration on E. Coli.....	20

#### PHARMACOLOGY

Structure of $\text{Ca}^{2+}$ Binding Site on Phospholipase A <sub>2</sub> From Venom of Central Asian Cobra Naja Naja Oxiana.....	21
Comparative Studies on Kinetic and Physicochemical Characteristics of Phospholipase A <sub>2</sub> Isoenzymes E2 and E3 From Venom of Naja Naja Oxiana Cobra.....	22

#### PHYSIOLOGY

Simulator of Bioelectric Action Currents.....	23
Physiological Interpretation of Statistical Data on Spike Trains of Interacting Neurons.....	24
Neuronal Mechanisms of Temporary Connections.....	24
Telephone in Electrophysiological Research.....	25
Comprehensive Assessment of Heart Rate Regulation in Dosed Functional Loads.....	25

#### PUBLIC HEALTH

Deputy Minister Novikova Interview on Soviet Pediatric Care,....	27
Psychological Training for Firemen.....	32
Resolution on Improving Health Care in USSR.....	34
Export of Medical Products Discussed.....	40
New Moldavian Hospital Complex Discussed.....	43
Fundamental Trends and Tasks in Development and Use of Data Processing in Public Health in 11th Five-Year Plan.....	46

Materials for Setting More Precise Hygiene Standards for General Transportation-Technologic Vibration.....	46
Levels of Physiological Reserves in Seamen Working 10-Hour Work and Rest Schedules.....	47
Condition of Cardiovascular System in Air Traffic Controllers Based on Studies Done at Working Place.....	47
<b>RADIATION BIOLOGY</b>	
Combined Effects of Hyperthermia and 8-Bromocaffeine or Actinomycin D on Postradiation DNA Repair in Mammalian Cells.....	49
Synergistic Effects of $\gamma$ -Radiation and Radiotoxins. Part 2. Differentiation, DNA Synthesis, and Chromosomal Aberrations...	49
Radioprotective Effectiveness of Polyriboinosinic-Polyribocytidilic Acid (Poly I-Poly C). Part 1. Poly I-Poly C-Mediated Protection of Hematopoietic System and Survival of Irradiated Animals.....	50
Mechanism of Radioprotective Action of $\beta$ -Mercaptoethylamine Mediated by Cyclic Nucleotides.....	50
Radioprotective Effects of Cystamine and Mexamine in Two Successive Mitotic Cycles.....	51
Metronidazole-Induced Changes in Tumor Radiosensitivity, Oxygen Tension, and Cellular Respiratory Rate.....	52
Radioprotective Effects of Cysteamine in Wild Type and Mutant Yeast Strains.....	52
Morphological Changes in Cortical Neurons in Rats Following Exposure to Protons of Different Energies.....	53
Effects of Short-Wave UV Irradiation of HeLa Cell Clones on Frequency of Genome Mutations.....	53
New Approach to Determination of Correlation Between Radioresistance and Metabolism in Mammals.....	54
Variations in Charged Particle Track Lengths in Microobjects in Relation to Irradiation Conditions.....	54
Dosimetry of Ionizing Radiation.....	55
Magnetic Field Modification of X-Irradiation Effects.....	55

Radiobiological Effect of $\alpha$ -Emitting Radionuclides Incorporated Into Lungs, Part 1. Pulmonary Microdistribution of Thorium-232-Containing Insoluble Dust.....	56
Effects of Activators of cAMP Accumulation on Individual Steps of Cellular Gene Expression in Animals With Acute Radiation Sickness. Part 3. Comparative Studies on Characteristics of RNA Synthesized by Isolated Hepatocyte and Splenocyte Nuclei in Irradiated Rats and Other Animals Pretreated With Serotonin.....	56
Treatment of Experimental Radiation Sickness With Dysentery Divaccine and Its Effect on Immune Response to Heterologous Antigen.....	57
Modeling Postradiation Cell Recovery and Effective Dose Diminution Principle. Part 2. Cell Recovery Model Under Arbitrary Irradiation Conditions.....	57
Equivalent Doses, Dose Rates, and Chronic Exposure Times to Ionizing Radiation for Different Mammals.....	58
Microdosimetric Characterization of Sources of Monoenergetic Neutrons.....	58
Effects of Activators of cAMP Accumulation on Individual Steps of Cellular Genome Expression in Acute Radiation Injury, Part 4: Effects of Cytosol Factors Regulating Transcription and Nuclear Release of RNA and of Radioprotective Agent Serotonin in Irradiated Animals.....	59
Oxygen Effect and Cellular Adaptation, Part 7; Experimental Evaluation of Radiochemical and Metabolic Oxygen Uptake on Radioprotective Effects of Acute Hypoxia in Irradiated Cell Suspension.....	59
Transport Characteristics and Radioprotective Action of Methylated Hematoporphyrin in Cell Culture.....	60
Neutron and $\gamma$ -Radiation Induced Prototrophic Revertants in Escherichia Coli.....	60
Bone Marrow and Thymic Effects of Radiation Combined With Thermal Injury or Bone Fracture.....	61
Mathematical Models for Postradiation Lymphopoiesis.....	61
Radioprotective Effectiveness of Cystamine on Intramuscular Administration to Mice.....	62
Effects of Hypoxic Radiosensitizers on Survival and Colonial Morphology of Wild Type and Radiosensitive <i>Micrococcus radiodurans</i> Mutants.....	62

Radiosensitivity of Animals Irradiated in Modified Gaseous Environment, Part 4: Effects of Breathing Normobaric Pure Oxygen on Proliferative Activity of Hematopoietic Tissue and Duodenal Epithelium.....	63
Hypoxic Gas Mixture in Embryo Radioprotection.....	63
Role of Endogenous Substances in Enhancing Radioresistance Part 13: Effects of Certain Radioprotectors on Lipid Peroxidation.....	64
Increased Tolerance of Static Load in Rats Protected by Hypoxic Gas Mixture During Irradiation.....	64
Distribution and Biological Activity of Tritium Oxide on Chronic Intake.....	65

## VIROLOGY

Persistence of Epidemic Influenza Virus (H1N1) Genes in Natural Populations.....	66
Persistence of Tick-Borne Encephalitis Virus in M. Rhesus Monkeys With Experimental Allergic Encephalomyelitis.....	67
Rapid Production and Characterization of Influenza A Virus Variants Resistant to Amantadine and Remantadine.....	67
Effectiveness of Aerosol Combination of Remantadine and Ribamide Against Experimental Influenza in White Mice.....	68
Variability in Virulence of Recombinant Influenza A Viruses....	68
Effects of Protease Inhibitors on Influenza Virus Reproduction.....	69
Use of Inbred Mice in Evaluation of Neurovirulence of Tick-Borne Encephalitis Virus Complex and Immunogenicity of Vaccine.....	69
Characteristics of Persisting Tick-Borne Encephalitis Viruses in Different Forms of Chronic Encephalitis in Animals.....	70
Mouse Models of Mixed Infections With Tick-Borne Encephalitis and Powassan Viruses.....	71

AEROSPACE MEDICINE

UDC 340.66:629.73

MODELING IN INVESTIGATION OF AVIATION ACCIDENTS

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 25, No 2,  
Apr-Jun 82 (manuscript received 12 Nov 81) pp 3-4

ALPATOV, I. M., Moscow

[Abstract] A brief survey is provided of the value of models, which simulate in-flight conditions, in explaining lesions and trauma found in air crews following an aircraft crash. In addition, consideration is given to biochemical examination of dried blood on clothing, equipment, etc., for an evaluation of the antecedent physiological state of the crew since such blood undergoes fewer postmortem alterations than blood in the body. Valuable information can also be derived from studies on the behavior of individuals subjected to hypoxic conditions (inhaling 8.5-11% oxygen gas mixtures) in simulated cockpits. Figures 3; references 6: 2 Russian, 4 Western.  
[424-12172]

UDC 340.661:629.72]:340.692

RETROSPECTIVE EVALUATION OF CONDITION AND BEHAVIOR OF FLIGHT CREWS IN AVIATION ACCIDENTS

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 25, No 2, Apr-Jun 82  
(manuscript received 22 Sep 81) pp 5-7

KLYUYEV, A. V. and ARTEMOV, V. N., Aviation Medicine Branch, State Scientific Research Institute of Civil Aviation, Moscow

[Abstract] In order to determine individual factors which may contribute to a fatal air crash, the areas of research currently followed at the Scientific Research Institute of Forensic Medicine encompass determination of antecedent intravital pathology of the flight crew, effects of toxic agents (released on combustion of polymers, for example), effects of drugs, effects of various stress factors (hypoxia, decompression, etc.), functional behavior, and emotional state at the time of death. References 8: 3 Russian, 5 Western.  
[424-12172]

BIOCHEMISTRY

UDC 597.0/5-11

OLFACTION IN DEFENSE RESPONSE OF GRASS CARP CTENOPHARYNGODON IDELLA (VAL.)  
(CYPRINIDAE) TO ALARM PHEROMONE

Moscow VOPROSY IKHTIOLOGII in Russian Vol 22, No 2, Mar-Apr 82  
(manuscript received 27 Dec 80) pp 303-307

KASUMYAN, A. O. and PASHCHENKO, N. I., Chair of Ichthyology, Moscow State University, Moscow

[Abstract] Experiments conducted with the grass carp fry (*Ctenopharyngodon idella*) demonstrated that treatment of the olfactory mucosa with 0.5% detergent Triton X-100 (known to inhibit olfaction) completely abolished the defense response to the presence of low concentrations of the alarm pheromone for 8-12 h. The mechanism involves a decrease in sensitivity to the pheromone by 8-9 orders of magnitude. References 6: 4 Russian, 2 Western.  
[6-12172]

UDC 597.0/5-15

ALARM PHEROMONE AS STRESS FACTOR FOR FISH

Moscow VOPROSY IKHTIOLOGII in Russian Vol 22, No 2, Mar-Apr 82  
(manuscript received 3 Apr 80) pp 338-341

MALYUKINA, G. A., MARTEM'YANOV, V. I. and FLEROVA, G. I., Moscow State University; Institute of Biology of Inland Waters, USSR Academy of Sciences

[Abstract] Investigations on the alarm pheromone as a stress factor were investigated on bram fry (*Abramis brama*) with respect to season at constant temperature (18-20°C). The results confirmed the effects of the alarm pheromone in depressing blood levels of sodium and causing an elevation of potassium concentration, and showed that changes in the biochemical indicators were much more pronounced in the summer than in the fall.

References 7: 4 Russian, 3 Western.  
[6-12172]

## EPIDEMIOLOGY

### PREVENTION AND TREATMENT OF SKIN LEISHMANIASIS

Ashkhabad TURKMENSKAYA ISKRA in Russian 5 Aug 82 p 4

[Article by Professor Mamed Ereshovich Ereshov, assistant director of the Turkmen Scientific Research Institute for Skin Diseases and doctor of medical sciences: "Skin Leishmaniasis--Prevention and Treatment"; edited by assistant editor M. I. Tarannik]

[Text] Summer is a time of mass exodus of people from the cities, heading for the nature of the countryside, cool reservoirs, areas with summer homes. It is precisely during this time--the hot summer months--that a disease appears which can cloud the vacations of our republic's residents. We are speaking of skin leishmaniasis, or more simply, Oriental sores, a disease that is encountered often in our region and leaves permanent scars on a person's body. Our readers have asked the editors of this paper to discuss several questions: What does this disease consist of? What methods of treatment exist? How can one protect oneself from the disease? Professor Mamed Ereshovich Ereshov, assistant director of the scientific division of the Turkmen Scientific Research Institute for Skin Diseases, and doctor of medicinal sciences, will answer our reader's questions.

Skin leishmaniasis is a disease of hot countries, communicated to human beings through bites by infested mosquitoes. The disease is characterized by the appearance of small lumps at the site of the bite with subsequent formation of ulcers that do not heal for a long time and infection of lymphatic vessels and nodes near the ulcers.

There is no innate or inherited immunity against skin leishmaniasis. But as a rule, someone who has had the disease develops a fairly strong immunity and will not be reinfected.

In the USSR, skin leishmaniasis is encountered in the republics of Central Asia and the Transcaucasus. Currently there is a so-called rural type of the disease, characterized by the typical natural-domestic disease. It is

spread throughout rural areas, on the outskirts of towns that have large rodent populations (gophers, sand rats) that are natural sources of infection. Mosquitoes live in the rodents' burrows and become infected by the already infected animals; then their bites infect people.

The problem of treating skin leishmaniasis first arose around 100 years ago. Many local remedies were initially suggested including surgical, destructive and other methods. Their inefficacy and unsoundness soon became apparent, however, and the need arose to find specific medications for general treatment of the disease. Persistent research began and was carried on for many decades.

Soviet scientists, and particularly scientists from Turkmenistan, achieved significant success in the study of skin leishmaniasis. Experimental and clinical tests of numerous medications, carried out over the last 20 years in the Turkmen Scientific Research Institute for Skin Diseases, confirmed the effectiveness of our domestic antibiotics monomycin, metacyclin, vibramycin, solusurmin, and others. These drugs are taken up by the blood and circulated throughout the entire body; they enter all the tissues and cells, and some of them selectively concentrate themselves in the infected area of the skin. They can destroy the source of the disease within 3-5 days, or in extreme cases, 5-10 days after beginning treatment. The ulcers begin to heal in 1-2 weeks and after 3 weeks there should be complete recovery.

The primary value of these specific treatments is their universality. They can be applied in all stages of the disease and in any localized area of infection; they can be used to treat different forms of the disease and complications that are caused by a suppurative infection. Treatment with these drugs frees the patient's body from the source of the disease, disrupts the course of the disease, and quickly restores people's ability to work.

Recently a group of surgeons from the Ashkhabad Clinical Hospital imeni Semashko joined in the treatment of skin leishmaniasis; they are using a laser device in their treatment. Tests have shown that it can be applied to a single area of infection in the earliest stage, or just the opposite, it can be used in the final stage of the disease when healing of the ulcers is delayed because of some inhibiting factors.

How can one protect oneself from the disease? Prevention of skin leishmaniasis consists of both social and personal prophylaxis. Social measures include steps to destroy the sources and carriers of the disease in the natural surroundings and destruction of mosquitoes in outbuildings in cities and small towns.

A reliable method for personal prevention is protective vaccinations. They promote a lifelong immunity similar to that due to an initial natural infection. The vaccinations should be done during a strictly defined time period in the autumn and winter--between October and February, when there is no possibility of natural infection.

Repellents can also be used for personal protection; these are chemical substances with a strong odor. They are produced as creams, lotions, etc. The strong odor repels mosquitoes and other insects, protecting the person from their bites. The repellents include dimethylphthalate, repudin, dibutyl-phthalate, hexamide, DID, DETA, and others.

When using a repellent, it is recommended that it be applied with the onset of the mosquitoes' activity in the evening, pouring several drops into one's palm and spreading it over the exposed areas of the extremities, neck and face last, being careful not to get any in the eyes. In light of the repellents' volatility and short-term action, it is wise to treat the skin a second time after several hours.

Finally, for individual protection, gauze bed-curtains can be used. When they are in good condition and properly used, they are a reliable defense against mosquitoes and other insects.

The remarkable discoveries made by Turkmen specialists in the field of epidemiology pathogenesis, clinical practice, diagnosis, immunity, immunopreventive care, and treatment of skin leishmaniasis, have served as a starting point for the large strides that have been made in the battle against this disease. Their principal result has been elimination of the urban type of skin leishmaniasis which used to occur frequently in the republic's cities.

By a decision of the Scientific Council of the USSR Academy of Medical Sciences, the Turkmen Scientific Research Institute for Skin Diseases, which will be 50 years old this year, has been named the chief scientific institution for the study of skin leishmaniasis in the USSR. This makes the institute responsible for uniting and coordinating the efforts of institutions in the republic and the country as a whole in studying this disease and for finding new means of effective treatment and prevention.

9967  
CSO: 1840/417

UDC 599.32:616.981.455

TULAREMIA SUSCEPTIBILITY OF EASTERN SIBERIAN AND SAKHALIN VOLES

Moscow BYULLETEN' MOSKOVSKOGO OБSHCHESTVA ISPYTATELEY PRIRODY: OTDEL  
BIOLOGICHESKIY in Russian Vol 87, No 2, Mar-Apr 82  
(manuscript received 30 Jan 81) pp 32-34

OLSUF-YEV, N. G., SHLYGINA, K. N., KOVAL'SKAYA, Yu. M. and  
BARANOVSKIY, P. M.

[Abstract] Field voles from Eastern Siberia (*Microtus mujanensis* Orl. et Kov.) and the Far East (*M. sachalinensis* Vassin) were infected with different doses of the tularemia agent to determine their susceptibility and potential carrier roles. All (13/13) of the *M. mujanensis* voles succumbed within 5-15 days, whereas only 4 of the 11 infected *M. sachalinensis* voles died. These findings indicate that in their natural habitats *M. mujanensis* constitutes a much greater danger as a carrier of tularemia than *M. sachalinensis*. The pathologic findings in both species were similar. References 3 (Russian). [425-12172]

## GENETICS

### NEW CULTIVARS

Kiev PRAVDA UKRAINIAN in Russian 24 Aug 82 p 3

[Article by S. Gershenson, doctor of biological sciences, academician of the UkrSSR Academy of Sciences: "Plants That Did Not Exist"]

[Text] Man improves cultivated plants so that they would yield larger harvests, would be able to withstand inclement weather and diseases. We are gladdened by reports about new, valuable cultivars.

Experimental mutagenesis holds a prominent place in modern agricultural plant breeding, i.e., the possibility of artificially altering heredity. The foundation for using this method was laid in the USSR as far back as the 1930's, but active research was deployed only in the last few decades. In 1966, a department of experimental mutagenesis was opened at the UkrSSR Academy of Sciences.

V. V. Morgun, doctor of biological sciences and department chief, P. K. Shkvarnikov, doctor of biological sciences and scientific consultant, V. S. Boreyko, candidate of biological sciences and senior scientific associate, who are scientists on the staff of the Institute of Molecular Biology and Genetics, UkrSSR Academy of Sciences, together with Prof V. F. Peresypkin, corresponding member of the All-Union Academy of Agricultural Sciences imeni Lenin, who is at the Ukrainian Agricultural Academy, and I. P. Chuchmiy, candidate of biological sciences, along with the Cherkassy State Experimental Agricultural Station have conducted combined scientific research with the help of a few kolkhozes and sovkhozes and developed methods of inducing mutations, i.e., artificial changes in heredity. Theoretical data were published extensively in our country and abroad, and they were highly praised.

The practical results are equally impressive. New valuable forms of agricultural plants have been developed. There is a particularly good variety of winter wheat, "Kiyanka." This sturdy, short-stalked nonlodging wheat is resistant to a number of diseases and produces a rather large harvest. Even under the adverse weather conditions of recent years, we succeeded in harvesting an average of about 55 quintals of grain per hectare, and 70-86 quintals per hectare where the soil fertility is good. The flour produced from it has excellent baking qualities.

"Kiyanka" has been zoned in seven oblasts of the Ukraine after extensive state testing. Seed material is sent to RSFSR and purchased by Bulgaria, Czechoslovakia,

Hungary and Great Britain. The cultivar was produced on the basis of experimental mutagenesis and tested within a record time--11 years. New and valuable corn hybrids have also been developed: "Jubilee-60," "Accord-72," "Collective-244," which guarantee a harvest of 80-106 quintals per hectare in the forest-steppe region. At the present time, they cover more than 100,000 hectares of production areas.

This cycle of research is among the first in both the USSR and abroad.

10,657  
CSO: 1840/444

## UPDATE ON MOLECULAR GENETICS--RNA POLYMERASE

Moscow PRAVDA in Russian 26 Jul 82 p 7

[Article by Academician A. Bayev, Hero of Socialist Labor: "At the Source of Life--Nomination for USSR State Prize"]

[Text] How did life and the unusual diversity of its forms appear? How is the continuity of generations upheld? What are the chemical compounds of which a living organism is "built," and how do they change in the course of vital processes? These questions have long since occupied the human mind. But answers to them were gained only in our times.

It was found that genetic information is recorded by chemical compounds in molecules of deoxyribonucleic acid--DNA--which is present in every cell of all organisms. Expression of genetic information occurs in two stages. First, one of the most complex enzymes of the cell, RNA polymerase, "reads" it and "translates it into another language," synthesizing new nucleic acid, RNA. The latter contains the same information as DNA, but it is recorded in different symbols. Other cellular systems--ribosomes--use this information to synthesize diverse proteins, from which the living cell is built. Thus, we have a chain over which the genetic information travels in the cell: DNA--RNA--protein.

Today, scientists are trying to delve even deeper into the world of the cell and find out how the molecules that effect this movement are arranged. One of these studies has been nominated for the USSR State Prize. It was conducted at two institutes under the USSR Academy of Sciences: Institute of Bioorganic Chemistry imeni M. M. Shemyakin and Institute of Molecular Genetics, and it was entitled "Structure and Genetics of RNA Polymerase."

RNA polymerase is a very large and complex protein that consists of several simpler ones, so-called subunits. The research team headed by Academician Yu. A. Ovchinnikov and R. B. Khesin-Lur'ye, corresponding member of the USSR Academy of Sciences, was faced with a rather complicated task: to identify the structure of RNA polymerase and study its genetics.

It should be borne in mind that protein molecules are polymers. They consist of monomers--amino acids interconnected into a chain that is called a polypeptide. Various proteins differ from one another in number and sequence of amino acids. In order to give an idea of the scope of the given task, suffice

it to indicate that the total length of polypeptide chains of all subunits of RNA polymerase exceeds 3000 amino acids, and 2 of these subunits contain 1300 and 1400 amino acids in their chains.

Of course, there has been marked progress in the techniques used for this work since the English scientist, F. Sanger, first identified in 1953 the structure of insulin, a very small protein containing only 51 amino acids. But even today, it is an extremely difficult task to define the structure of RNA polymerase.

It should be noted here that nucleic acids--DNA and RNA-- are also biopolymers. Their chains are formed by nucleotides, the alternation of which is the means of inscribing genetic information. Genes are specific segments of DNA, and there is a gene that corresponds to each protein. The strategy adopted by Soviet researchers consisted of defining the structure of only fragments of protein when analyzing it. In addition, a complete analysis was made of the genes coding this protein, so that it was possible to form an idea, on the basis of the genetic code, about the structure of the entire polypeptide chain of the protein. At present this can be done much faster than protein analysis, but it is easier to make mistakes, yet even a solitary error (particularly overlooking a nucleotide) would lead to a totally wrong conclusion about the structure of the protein. However, in the study we are discussing, there was checking of any mistake: the hypothetical structure of the protein was compared to the structure of its fragments, which was determined by direct analysis.

Some teams of scientists in Western Europe and the United States had tried to solve the same problem. This imparted a spirit of creative competition to the work, an additional element of responsibility and tension. At some point in time, one could read that the team of the American researcher, Nomura, is successfully completing its investigation, for example in such an authoritative journal as NATURE, which is published in England. After such news, many could give up, but the team of the Institute of Bioorganic Chemistry continued its search and speeded it up. And then victory--the structure of the largest protein was identified before anyone else!

The success of Soviet scientists had considerable international reverberation. It stimulated many studies based on data about the structure of RNA polymerase, both in our country and abroad. This is what the English scientist, Robert Glass, of Nottingham University wrote in a letter to its authors: "Our work would be inconceivable without your sequence [consistency?]. Thank you very much." And this is far from being the only letter of this kind.

Soon after publication of the work of the Soviet scientists, articles started to appear about the results of identifying the structure of fragments of genes of RNA polymerase, obtained by Canadian and U. S. scientists. All of them contained a considerable number of mistakes, which are apparently inevitable with the most conscientious analysis of gene structure if it is not backed up by determination of protein structure.

The result that was achieved by the team of Yu. A. Ovchinnikov at the Institute of Bioorganic Chemistry, completed the phase of research related to isolation

and investigation of properties of the isolated molecules. But the final task was to gain understanding of the mechanism of action of this enzyme, in all its relationships in the cell. For this reason, the part dealing with genetics of RNA polymerase plays the most important role in the study submitted for the State Prize.

Virtually every change--mutation--of this enzyme, which is of vital importance to the cell, leads to its death. It is all the more important to study such changes. But then a vicious circle is formed. On the one hand, if the researcher induces a mutation he will ruin the cell, the enzyme will become inactive, inefficient and it could not be studied. On the other hand, in order to conduct a functional investigation, one must still induce a mutation, force the altered enzyme and, consequently, the cell to live and function. Figuratively speaking, one has to revive the dead enzyme and cell that died because of it. Or else, one should try to use the "bypass maneuver," find mutations that would not affect the main functions of the enzyme, but would alter appreciably one of its other properties.

A clever idea for solving the problem was born in the studies of the team headed by R. B. Khesin-Lur'ye, corresponding member of the USSR Academy of Sciences, working at the Institute of Molecular Genetics: to find mutations that would be expressed under some conditions and not under others. This was done and led to success. Virtually simultaneously with this, two teams of foreign scientists reported about the use of another detour. They found mutations that did not affect the main functions of the enzyme, but imparted to cells resistance to the antibiotic, rifamycin. Ordinary, normal cells perish under its influence. It was found that the enzyme of resistant cells also functions in the presence of the antibiotic.

Both groups of mutations played an inestimable role in functional studies of the enzyme. But, until recently it was not clear as to where they cause damage in the RNA polymerase molecule. The team of R. B. Khesin-Lur'ye obtained the answer to this question too. Scientists studied the structure of mutant enzymes and found it to differ from the initial one. This laid the cornerstone for investigation of the correlation between structure and function of RNA polymerase.

In recent years, enormous attention is being given all over the world to development of molecular biology and molecular genetics. In our country, such research received high praise and support in the decrees of the CPSU Central Committee and USSR Council of Ministers: "Steps to Expedite Development of Molecular Biology and Molecular Genetics, and Utilize Advances Therein in the National Economy" (1974) and "Further Development of Physicochemical Biology and Biotechnology, and Utilization of Advances Therein in Medicine, Agriculture and Industry" (1981). It is not by chance that attention is given to them. These disciplines, which were purely theoretical until very recently, opened up utterly new horizons for man's practical endeavors. Genetic engineering was conceived on their basis and it permitted, for example, recovery from inexpensive microbiological raw material some products that are very important to medicine and agriculture, which were virtually unattainable before.

The role of work on the structure and genetics of RNA polymerase, which was done in accordance with these decrees, aside from the purely scientific one,

is that it, among others, laid the foundation for development of genetic engineering. Variants of bacteria were produced at the Institute of Bioorganic Chemistry, which synthesize a number of hormones; work is being completed on creation of highly productive bacteria that synthesize substances important to medicine, such as insulin and human interferon. The day is not distant when people will learn to delve into the inner world of even more complicated beings, including man himself. All this no longer seems fantastic, and the cycle of studies entitled "Structure and Genetics of RNA Polymerase" is the step from today to tomorrow.

10,657  
CSO: 1840/446

## MEDICINE

### ULTRASOUND USED TO TREAT EYES

Kiev PRAVDA UKRAINY in Russian 3 Sep 82 p 3

[Article by N. Puchkovskaya, director of the Odessa Scientific Research Institute of Eye Diseases and Tissue Therapy imeni Academician V. P. Filatov, Hero of Socialist Labor, Academician of the USSR Academy of Medical Sciences]

[Text] At the Odessa Scientific Research Institute of Eye Diseases and Tissue Therapy imeni Academician V. P. Filatov, intensive use is being made in ophthalmological practice of the advances in physics, radio electronics, acoustics and quantum optics. On their basis, existing methods and equipment are being refined and new ones developed for diagnosing and treating eye diseases.

At the present time, ultrasound has taken a prominent place in the vast arsenal of instrumentation methods of examining and treating patients with pathology of the eye. Use thereof has undergone exceptional development in the last 10-15 years.

Soviet specialists, under the leadership of Prof R. K. Marmur, have made a sizable contribution to development of this scientifically and clinically important direction. Work was started as far back as the 1960's, on virtually unique "virgin soil." All that the ophthalmologists had at their disposal were a few reports on attempts to use ultrasound in ophthalmology and a few clinical cases, in the complete absence of special equipment.

Diverse experimental studies on animals were conducted. Comprehensive investigations were made of mechanisms and distinctions of effects of ultrasonic energy on the eye; original methods were developed for treating the eye with ultrasound, and its safe "zone" was determined. Original pieces of equipment were designed.

At the present time, ultrasound is being used with success in the combined therapy of patients with inflammatory diseases of the eye, traumatic injuries and burns, intraocular hemorrhages and opacities of clear media, some post-operative complications, palpebral skin cancer and other diseases.

For the first time in worldwide practice, Prof R. K. Marmur proposed the use of ultrasound for such serious eye diseases, which respond very poorly to therapy, as dystrophic retinal lesions (and, first of all, pigment degeneration),

atrophy of optic nerves of diverse origin. Thanks to ultrasound therapy, vision can be improved in 60-70% of the patients, whereas it improves quite substantially in 30% of the cases. The efficacy of the developed methods of therapy has been confirmed by clinical observations that were unique in scale: we refer to almost 10,000 patients.

The clinical data, which are based on examination of over 80,000 patients, made it possible to determine the diagnostic value of ultrasound, particularly when the usual methods of examination are ineffective. Ultrasonic diagnostic methods are used extensively for trauma, cataract, glaucoma, separation of the retina, tumors of the eye, disturbances referable to refraction and other diseases.

The therapeutic methods, which have been developed, are now in use in many medical institutions of the Soviet Union and taken over by specialists of several other countries--Bulgaria, Poland, Hungary, Czechoslovakia, Cuba, GDR, Vietnam, Finland and Italy.

A number of prominent scientific organizations, institutions and major specialists have praised the results of work on this matter. They commented on the great scientific contribution of the authors to medicine, biomedical acoustics and public health care, and they supported nomination of this set of investigations for the Ukrainian SSR State Prize in the field of science in technology for 1982.

10,657  
CSO: 1840/436

## MICROSURGERY--UPDATE

Moscow PRAVDA in Russian 20 Jul 82 p 3

[Article by N. Malinovskiy, academician of the USSR Academy of Medical Sciences, Moscow: "High-Precision Surgery--Nomination for USSR State Prize"]

[Text] In 1973, the department of microsurgery was opened at the All-Union Scientific Research Institute of Clinical and Experimental Surgery, USSR Ministry of Health. It was headed by Prof V. S. Krylov. Subsequently, this department changed into a section organized at the institute of the All-Union Surgical Research Center of the USSR Academy of Medical Sciences.

Major research work that was deployed there made it possible to perform amazing operations. Bending over the oculars of special microscopes, surgeons re-implanted fingers, toes and even limbs which the patient should have apparently lost forever. The minutest manipulations with internal organs also became feasible.

It soon became apparent that a new branch of surgery was emerging, which offered basically different, unprecedented possibilities. For this reason, the USSR Ministry of Health decided to form, in 1978, an entire network of microsurgery centers in the nation, and the All-Union Center became the country's first such department. The head institution performed much organizational work, as a result of which microsurgery centers opened up in Tbilisi, Leningrad, Kiev, Saratov, Kuybyshev, Tashkent, Yerevan and other cities.

In the microsurgery department of VNTsKh [All-Union Surgical Research Center?] alone, more than 1500 operations have been performed under a microscope. The limbs have been spared for hundreds of patients, including children, which had been stricken due to serious trauma or diseases. More than 70 operations were performed to correct facial cicatricial defects; many interventions were made also to correct such defects on the neck. A large group of disabled people with so-called adactylia of the hand regained their work capacity. The last mentioned operation, perhaps, demonstrates very graphically the high level of medical care, without which microsurgery would be impossible.

At present, we are faced with the question of broad dissemination of the developed techniques, so that operations that strike the imagination and are called unique today would soon become routine.

Where will these high-precision operations find the most application?

First of all, it will be in traumatology and orthopedics, where they have already made a very good name for themselves. This includes replantation (return to their former place) of fingers, toes, hand, an entire limb and correction of various hand deformities due to trauma (including transplantation of toes to the hand, skin and bone plastic surgery). Here are only two recent instances of operations that were successfully performed by Moscow micro-surgeons.

The smoke-puff charge exploded in the hands of M., a 21-year-old military pilot. The phalanx of the thumb of the right hand had to be amputated. The medical commission concluded that he had to be grounded. He changed his occupation. But he had a great desire to return to his former job. Then came an extremely complex operation: transplantation of the second toe from the left foot to the stump of the right thumb, using a microtechnique. Result: the finger became elongated and functions well. The pilot is flying again!

Patient E., 19 years old. Clinical diagnosis: complete traumatic amputation of the left hand on the level of the carpometacarpal joint, open fracture of the right hand in the region of the radiocarpal articulation and multiple fractures of carpal bones and phalanges. Both hands of this young man got in the way of the wheels of a railroad car....

The microsurgery lasted 25 hours. Vessels and nerves were submitted to the necessary treatment, the carpal bones of the amputated hand were shortened. Then, so-called metalloosteosynthesis was performed with metacarpal bones, the tendons were sutured and five veins repaired under a microscope. A new arterial arch was created on the palm, for which purpose a venous graft was used. After removal of the clamps, the palmar arterial arch functioned normally. The hand graft worked! Both hands will function in 1 year.

Physicians are also being drawn to transplantation of bones on microvascular anastomoses (in other words, together with the tiniest vessels that continue to deliver blood to osseous tissue). When the supply to transplanted bone is restored by means of its own vessels this accelerates considerably, according to the results of many studies, healing time and reduces the probability of infection. In our country, such operations have already been performed. The results are quite encouraging.

In spite of the high safety standards in modern industry, severe scalping-type damage to the limbs are still encountered, with loss of muscle and integument. Replacement of skin is no longer a major problem. Transplantation of muscle tissue on a vascular pedicle also permits replacement of missing muscles.

Problems that currently confront specialists are referable to surgery for transplantation of so-called compound flaps, which consist (in different combinations) of muscle, bone, integument with supplying vessels and nerves, fine articulations of the foot (in plastic surgery or replacement of hand articulations). Expressly they largely determine the future of traumatology and orthopedics.

Microsurgical methods are quite promising for reconstructive intervention on the esophagus. Restoration of circulation in the long intestinal transplant, the area of which is considerable, increases appreciably its viability. In reconstruction of bile ducts and the pancreatic duct, use of delicate instruments and surgery under a microscope also reduce the probability of complications. Several dozen of such operations have already been performed in the world. Correction of extensive defects of the abdominal wall, which occur in connection with postoperative complications, is also possible by transferring large blocks of muscle with integument on nutrient microanastomoses (with microvessels delivering blood).

Cardiovascular surgery, organ and tissue transplantation, traumatology and orthopedics, plastic and maxillofacial surgery, pediatric surgery, surgical interventions in gynecology and urology--these and other specialized forms of surgery could not exist without microsurgery. Moreover, they are developing largely because of it.

Nomination for the 1982 USSR State Prize of a team of specialist-microsurgeons is evidence of the recognition gained by the achievements of the Soviet pioneers in microsurgery.

Of course, like in any new field, there are growing pains and organizational problems.

Let us consider the question of whether the microsurgery centers, which are being organized, should specialize in urology, gynecology, orthopedics-traumatology, etc. Generally speaking they should. But, we believe, not right away. At the present time, this would cause scattering of manpower, which is not yet so numerous. But when this manpower grows, then it will be desirable to turn to the second stage, at which the microsurgery centers will split up in accordance with the existing surgical specialties. For the time being, however, there should be general centers that would best meet the public needs. And, first of all, they should render emergency care to those who have lost fingers, hands or an extremity.

It is now time to implement organizational association of physicians who perform microsurgery. This could be done within the framework of the All-Union Society of Surgeons, by forming the appropriate section in it.

The USSR Ministry of Health and Ministry of the Medical Industry should see to it that development of the material base for this new direction is expedited. Adequate quantities of microsurgical instruments, surgical microscopes, fine sutures and traumatic needles, as well as special materials are needed.

And, of course, personnel should be trained for microsurgery. In particular, it would be desirable to start a relevant training course at the Central Institute for Advanced Training of Physicians, USSR Ministry of Health.

The immediate solution of these and other problems that arise will enable this new direction of medicine to become strong sooner and be of practical benefit sooner to many, many people.

UDC 612.821+612.821.6

EFFECTS OF CHRONIC ALCOHOL INTOXICATION ON TEMPORAL PARAMETERS OF 'MOTOR COMMAND' ORGANIZATION AND INTERHEMISPHERIC RELATIONSHIPS IN HUMANS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA in Russian  
Vol 32, No 4, Jul-Aug 82 (manuscript received 12 Feb 82) pp 741-743

POGREBINSKIY, S. A., All-Union Scientific Research Institute of General and  
Forensic Psychiatry imeni V. P. Serbskiy, Moscow

[Abstract] Studies were conducted on the times of motor response to visual stimuli in seven 25-50 year old alcoholics with a seven year history of alcoholism; the intervals between the anticipatory and eliciting stimuli (presented either to the right or left visual field and combinations thereof) ranged from 110 to 500 msec. In normal subjects the motor response time after the eliciting stimulus decreased by 70-90 msec when the interval between the anticipatory and the eliciting stimulus was increased to 200 msec. In the patients, a maximum reduction of 50 msec was recorded only after an interval of 300 msec, suggesting that in the latter group the process of cortical preparation, interhemispheric information transfer, and organization of the motor response were markedly slowed. Figures 1; references 3; 2 Russian, 1 Western.

[453-12172]

MICROBIOLOGY

UDC 577.158

ROLE OF CO-BINDING CYTOCHROME C IN ENZYMATIC OXIDATION OF METHANE BY  
METHYLOCOCCUS CAPSULATUS

Moscow BIORHIMIYA in Russian Vol 47, No 7, Jul 82  
(manuscript received 1 Jun 81) pp 1118-1124

GVOZDEV, R. I., NIKONOVA, Ye. L., PILYASHENKO-NOVOKHATNYY, A. I.,  
SHUSHENACHEVA, Ye. V., GRIGORYAN, A. N., BELOVA, V. S. and  
SHIROKOVA, L. A., Institute of Chemical Physics Branch, USSR Academy of  
Sciences, Chernogolovka; All-Union Scientific Research Institute of Protein  
Synthesis, Moscow

[Abstract] A cytochrome c capable of binding CO has been isolated from Methylococcus capsulatus and, on the basis of absorption profile, has been identified as cytochrome  $c_{CO}$ . This species of cytochrome  $c_{CO}$  is not a component of methane monooxygenase, does not activate the enzyme, and does not bind other substrates. It functions as an electron acceptor in methanol dehydrogenase system and may be involved in other dehydrogenase systems in *M. capsulatus* as an intermediate electron carrier in the membrane-bound electron transport chain. Cytochrome  $c_{CO}$  may possibly be involved in other processes in *M. capsulatus*. Figures 6; references 18: 5 Russian, 13 Western.  
[7-12172]

UDC 577.157

COMPOSITION AND SUBSTRATE SPECIFICITY OF FIBRINOLYTIC PREPARATION FROM THE FUNGUS FLAMMULINA VELUTIPES

Moscow BIORHIMIYA in Russian Vol 47, No 7, Jul 82  
(manuscript received 8 Jun 81) pp 1181-1185

MOROZOVA, E. N., FALINA, N. N., DENISOVA, N. P., BARKOVA, L. V., PSURTSEVA, N. V., SAMARTSEV, M. A. and SHITOVA, V. I., All-Union Scientific Research Institute of Especially Pure Biopreparations, Leningrad; Botanical Institute imeni V. L. Komaroy, USSR Academy of Sciences, Leningrad

[Abstract] A fibrinolytic preparation from the fungus *Flammulina velutipes* was subjected to analysis by gel chromatography, isoelectric focusing, and comparison of fibrinolytic, thrombolytic, caseinolytic, aminopeptidase, and endopeptidase activities with those of the Soviet fibrinolytic terrilytin and nonspecific proteinases from *Streptomyces griseus*. The *F. velutipes* preparation contained two components (isoelectric points—pI 6.1 and 7.1) with thrombolytic, fibrinolytic and endopeptidase activities, and two (pI 5.5 and 6.05) with aminopeptidase activities. Every activity was lost following treatment with EDTA or o-phenanthroline. The low caseinolytic activity suggests that this preparation may have clinical usefulness. Figures 4; references 13; 8 Russian, 5 Western.

[7-12172]

UDC 579.842.11:579.252.55.615.33]:579.222:547.963.32

EFFECTS OF R FACTORS ON DNA CONCENTRATION ON E. COLI

Moscow ANTIBIOTIKI in Russian Vol 27, No 7, Jul 82  
(manuscript received 24 Feb 82) pp 45-47

KOROTYAYEV, A. I. and KROLICHENKO, T. P., Chair of Microbiology, Kuban' Medical Institute imeni Krasnaya Armiya, Krasnodar

[Abstract] Investigations on *E. coli* mutants, MNal and MRif, showed that infection of these strains with plasmids R6K or pKMR200 had no effect on the number of elongated forms (2-4 undissociated bacteria), but decreased the generation time 1.5 fold. The DNA concentration in the lag and exponential phase of the plasmid-infected strains was also depressed (although it remained within the same order of magnitude as in uninfected strains). Figures 2; references 3 (Russian).

[411-12172]

PHARMACOLOGY

UDC 577.153.04

STRUCTURE OF  $\text{Ca}^{2+}$  BINDING SITE ON PHOSPHOLIPASE A<sub>2</sub> FROM VENOM OF CENTRAL ASIAN COBRA NAJA NAJA OXIANA

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 3, Mar 82  
(manuscript received 30 Oct 81) pp 349-363

MESHCHERYAKOVA, Ye. A., AYANYAN, A. Ye., KOSTETSKIY, P. V. and MIROSHNIKOV, A. I., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Spectral methods were employed in following the effects of chemical modification of phospholipase A<sub>2</sub> (EC 3.1.1.4), derived from the venom of the Central Asian cobra Naja naja oxiana, on the binding of Ca. Ca binding is required for enzymatic activity, does not alter the secondary structure, promotes dimerization, and occurs in a 1:1 molar ratio; dissociation of the complex depends on the ionization of Asn-1, an N-terminal amino group (pH 6.7), adjacent to Asp-38 carboxyl group (pK 3.5). Nitration studies showed that Tyr-27 is one of the Ca-binding ligands in the site. Asn-1-amino group stabilizes the native conformation of the enzyme and "fixes" the specific binding of the substrate. Ca-binding promotes approximation of Asn-1-amino group to a carboxyl group with pK 5.2 and the imidazole ring of His-47 (pK 7.8), and leads to hydrogen bond formation between the latter. On the basis of these findings a model has been proposed for the Ca-binding site. Figures 15; references 31: 7 Russian, 24 Western.

[408-12172]

COMPARATIVE STUDIES ON KINETIC AND PHYSICOCHEMICAL CHARACTERISTICS OF  
PHOSPHOLIPASE A<sub>2</sub> ISOENZYMES E2 AND E3 FROM VENOM OF NAJA NAJA OXIANA COBRA

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 3, Mar 82  
(manuscript received 19 Oct 81) pp 377-385

ANTONOV, V. K., D'YAKOV, V. L., ZIL'BERMAN, M. I., KONDRAVIN, S. K. and  
PAVLOVA, N. P., Institute of Bioorganic Chemistry imeni M. M. Shemyakin,  
USSR Academy of Sciences, Moscow

[Abstract] Thermodynamic and kinetics studies on the hydrolysis of short-chain synthetic substrates (1,2-diacyl-sn-glycero-3-phosphocholines) by the E2 and E3 isozymes of phospholipase A<sub>2</sub> (E 3.1.1.4), derived from the venom of the cobra Naja naja oxiana, showed that elongation of the alkyl chain lowered Km in the case of E3, while the catalytic constant remained unaffected and similar to the dissociation constant of the enzyme dimer. Activation of E2 by the substrate micelles is apparently due to a decrease in the enthalpy of activation of the hydrolysis, whereas with E3 activation is entropy dependent. The reaction mechanisms involve an initial binding of Ca<sup>2+</sup>, followed by substrate binding. Addition of the surfactant cetyltrimethylammonium bromide increased the rate of catalysis by E2 by raising the catalytic constant, but had no effect on E3. However, tryptophan fluorescence of both isozymes was affected by the substrate and surfactant micelles. The observed differences were ascribed to different rate limiting steps, which in E3 is the rate of dissociation of the phospholipase dimer. Figures 10; references 18; 8 Russian, 10 Western.

[408-12172]

## PHYSIOLOGY

### SIMULATOR OF BIOELECTRIC ACTION CURRENTS

Moscow VOZDUSHNYY TRANSPORT in Russian 11 Sep 82 p 4

[Article from TASS]

[Text] The human body is like a complicated electric generator: action currents are produced in all its organs and tissues. Some appear only when walking, from the burden on bones. The physicians of Latvia have started to reproduce such mild electric charges in therapeutic procedures.

A device based on integral circuits, which simulates natural action currents, was developed by the staff of the Latvian Scientific Research Institute of Traumatology and Orthopedics, together with the specialists of the VEF [state electrical engineering plant, Riga] Industrial Association.

As it was learned, the usual electric activity of a healthy bone stimulates metabolism and prevents calcium salts from being flushed out. Traumatologists have concluded that artificial stimulation of action currents is necessary for better fusion of fractures. Clinical practice confirmed the conclusions. The treatments used enable those who are bedridden to, so to speak, "walk" while lying down." Impaired physiological processes are restored in osseous tissue that is conditioned in this way. It regenerates faster. And, as a result, the course of therapy is shorter by several weeks.

10,657  
CSO: 1840/439

UDC 612.822.3

PHYSIOLOGICAL INTERPRETATION OF STATISTICAL DATA ON SPIKE TRAINS OF  
INTERACTING NEURONS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA  
in Russian Vol 32, No 4, Jul-Aug 82 (manuscript received 1 Jun 81)  
pp 676-685

ZOSIMOVSKIY, V. A., Laboratory of Neurophysiological Cybernetics,  
Institute of Higher Nervous Activity and Neurophysiology, USSR Academy  
of Sciences, Moscow

[Abstract] Rationale is provided for reliance on data processing in the physiological interpretation of statistical data on auto- and cross-correlation histograms depicting multineuronal spike trains. Multineuronal activity is interpreted in terms of mathematical models covering mono-synaptic transmission and the effects of pacemaker neurons on the statistical data, as well as alterations in the auto- and cross-correlation histograms induced by changes in those model parameters which affect interneuronal connections and afferent synaptic inputs. Figures 4; references 18: 8 Russian, 10 Western.  
[453-12172]

UDC 612.822.3+612.82

NEURONAL MECHANISMS OF TEMPORARY CONNECTIONS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA  
in Russian Vol 32, No 4, Jul-Aug 82 (manuscript received 29 Dec 80)  
pp 735-740

MATYUSHKIN, D. P., Physiological Institute imeni A. A. Ukhtomskiy,  
Leningrad State University imeni A. A. Zhdanov

[Abstract] A frog nerve-muscle preparation was employed in electro-physiologic studies as a model for facilitated transmission in the CNS,

believed to underlie temporary neural connections seen in conditioned reflexes. The experiments demonstrated that end-plate potentials were enhanced by muscle action potentials, lending support to the hypothesis that the activity of a "weak" synapse can be enhanced if its activity coincides with the spike activity of a neuron induced by some other potent synaptic input. The depressed membrane potential of the postsynaptic membrane is assumed to allow greater efflux of K ions under the influence of a neurotransmitter, and the K ions in turn exert a reverse antidromic facilitation of the conditioned synapse. Biochemically, potassium appears to be responsible for the metabolic activation and growth of Schwann cells around the motor nerve terminals which render the presynaptic events more efficient.

Figures 4; references 14: 11 Russian, 3 Western.

[453-12172]

UDC 612.813

#### TELEPHONE IN ELECTROPHYSIOLOGICAL RESEARCH

Moscow ZHURNAL VYSSHEY NERVOY DEYATEL'NOSTI IMENI I. P. PAVLOVA  
in Russian Vol 32, No 4, Jul-Aug 82 (manuscript received 14 Aug 81)  
pp 783-785

DEMIDOVA, N. I., Moscow Oblast Pedagogical Institute imeni H. K. Krupskaya

[Abstract] A historical survey is presented of the brief popularity of the telephone as a research tool in electrophysiological investigations in the 19th century. Leading proponents and developers of the telephone as an indicator of physiological information were the Russian physiologists I. R. Tarkhanov and N. Ye. Vvedenskiy. References 9: 4 Russian, 5 Western.  
[453-12172]

UDC 612.178

#### COMPREHENSIVE ASSESSMENT OF HEART RATE REGULATION IN DOSED FUNCTIONAL LOADS

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian  
Vol 68, No 8, Aug 82 (manuscript received 12 Nov 81) pp 1159-1164

SAPOVA, N. I., Leningrad

[Abstract] Interval cardiography was employed in assessing heart rate regulation in 152 healthy males, 19-43 years old, including both athletic and non-athletic individuals, in response to graded doses of physical (step test, exercise cycle, Martine test) and mental work. Heart rate regulation was established to be highly individualized and predicated on an innate balance of sympathetic and parasympathetic influences, as altered by afferent

impulsation entering the CNS as a result of physical or mental exertion. Regulatory mechanisms in the athletes showed superior adaptation to all forms of exertion and less pronounced cardiographic changes, in addition to an absence of compensatory and fatigue phases. The effects of mental activity were equivalent to light physical work. Figures 1; references 16: 15 Russian, 1 Western.  
[456-12172]

## PUBLIC HEALTH

### DEPUTY MINISTER NOVIKOVA INTERVIEW ON SOVIET PEDIATRIC CARE

Moscow UCHITEL' SKAYA GAZETA in Russian 7 Sep 82 p 1

[Interview with Yelena Cheslavovna Novikova, USSR deputy minister of health, by UCHITEL' SKAYA GAZETA correspondent A. Orleanskaya, date and place not specified: "Society's Priceless Asset"]

[Text] Concern about the health of Soviet people is considered by our party and government to be the most important social task. It is not by chance that so much attention is being given in our country to upgrading health care over the entire history of the Land of the Soviets.

At the 26th CPSU Congress, comrade L. I. Brezhnev said: "Everything must be done so that Soviet man could receive prompt, qualified and sensitive medical care always and everywhere."

Always and everywhere.... Now, in the year of the 60th anniversary of formation of the USSR, we can clearly see that the result of the Leninist national policy of our Party is, in particular, rapid development of public health in the republics that had virtually no physicians or system of medical institutions before.

For example, in 1922, there was 1 physician per 47,000 population in Tajikistan, 1 per 22,000 in Kazakhstan, 1 per 19,000 in Kirghizia, 1 per 11,000 in Uzbekistan and Turkmenia. At the present time there is 1 physician per 315 to 427 people in these republics. And it is important to stress that most of the physicians and paramedical personnel are indigenous to their republics.

The Soviet health service has unquestionably made great strides everywhere. Its material and technical base is being strengthened according to plan, medical figures are improving their performance. In 1978-1981 alone, the network of hospital facilities grew by 243,800 beds, constituting a total of 3,384,000 beds. Walk-in centers and polyclinics that can handle 481,600 visits per shift have been constructed. Educational establishments have trained more than 190,000 physicians.

The decree of the CPSU Central Committee and USSR Council of Ministers, which was published in the last few days, "Further Measures to Improve Public Health Care," provides for a large-scale program of further improvement of organization of medical care in our country.

Our correspondent addressed the USSR deputy minister of health, Ye. Ch. Novikova, with the request to grant an interview to UCHITEL' SKAYA GAZETA [Teacher's Newspaper] in connection with this important event.

[Question] Yelena Cheslavovna, the adopted decree is another convincing piece of evidence of the firmness of our Party's course--all for the sake of man, all for the good of man. It is guiding our medical service toward new frontiers. And a special distinction is made of the problem of mother and child health care. What is being done now and what is to be done in the immediate future to perform the tasks advanced in the Party and government document?

[Answer] I should like to stress that, as a result of the enormous socio-economic transformations in our country, it has become possible to guarantee the right to health care for every citizen. This right is fixed in the USSR Constitution, and it is implemented by a broad network of health care institutions, manned by specialists and furnished with modern medical equipment. At the same time, this decree notes that the potential for improving the quality of medical care is not being used fully by far. This refers to the many problems related to this and, in particular, strengthening the health of women and children.

The urgent steps, which are already being taken and will be taken, are directed primarily toward intensification of disease prevention.

Under the 11th Five-Year Plan, there will be further development of children's polyclinics, general [multispecialty] hospitals and sanatoriums by means of new construction. The proceeds of All-Union Communist unpaid mass work days [subbotniks] are being assigned for construction of mother and child care institutions.

At the present time, there are over 24,000 consultation centers for women, children's walk-in centers and polyclinics. Most of them are large facilities that handle 600-800 visits per shift. They are equipped with gym halls, swimming pools and physiotherapy offices.

Splitting up territorial pediatric districts will definitely have a beneficial effect on the quality of medical care for children. By the end of this year, each district pediatrician will take care of 800 children.

We have set the following goal for ourselves: each pediatric polyclinic must become a sort of center for rearing the healthy child, from the first days of life to the age of 15 years. It is not by chance that the rayon pediatricians and nurses get acquainted with the family even before an infant is born; they have talks with future parents to help them raise a healthy child. The network of medicogenetic consultation offices and "Marriage and Family" centers is growing constantly. The new decree makes it incumbent upon us to continue with the development of such institutions.

It is now standard procedure for a pediatrician to examine an infant 13-14 times in the first year of life, 4 times in the second year, twice in the third

year and once a year thereafter. In addition, there are consultations for children with a surgeon, orthopedist, neuropathologist, ophthalmologist and other specialists. Children referable to the so-called "risk group" are under special individual supervision.

Now there is a "healthy child room" in every polyclinic. There, graphic aids, methodological materials and booklets--in brief the entire "armamentarium" of medical education--have been assembled to help parents.

But what if a child becomes sick? Emergency pediatric care is developing intensively in all of the republics, and the course has been taken of forming specialized teams: for neonates, resuscitation, etc. This is, unquestionably, a very promising direction.

We devote particular attention to improvement of medical care in rural areas. Medical points are being created in small settlements, which employ three specialists--a therapist, pediatrician and stomatologist. There are now more visiting teams in rural areas; broader use is being made of other forms of mobile medical care: roentgenographic, stomatological offices, clinical laboratories and others. In recent times, large pediatric departments have been opening in all areas (with up to 60 beds) at central rayon hospitals.

In accordance with the decisions of the May (1982) Plenum of the CPSU Central Committee, the USSR Ministry of Health has worked out a plan of additional measures that will improve medical and health care of the rural population.

The position of physician dealing with child and adolescent hygiene has been added to the staff roster of rural sanitary and epidemiological stations.

[Question] It is written in the decree: "... to improve medical care of children in preschool institutions, paying special attention to providing systematic observation of the health status of children and implementation of health-improving measures." What routes are being taken to perform this task?

[Answer] Additional dispensary examinations of tots 3 and 5 years of age have been initiated in 1981. Why? In order to promptly detect any developmental deviations or changes in physical condition, and to correct the situation more effectively.

At the present time, we are taking steps to provide stomatological care right in the nursery schools, and conditions were provided for administration of physiotherapy, corrective exercise and therapeutic physical culture.

Specialists have developed new methods for mass-scale standardized examination of children. In particular, they have developed methods of early detection of talipes planus, scoliosis, visual and hearing impairment, etc. These methods will already be used this year.

We are gladdened at the fact that children are being stricken much less often by measles, scarlet fever, pneumonia and acute intestinal diseases. Such dangerous diseases as poliomyelitis, diphtheria and tuberculosis have been

virtually eradicated. At the same time, we are very concerned with the fact that many preschool children have frequent colds. This is why we discuss, again and again, the need for proper physical education for children, for conditioning them.

There are many instances where the joint efforts of educators, physicians and parents yield excellent results. For example, absence from school due to illness constitutes 7-8 and even 2 days per child per year at a number of nursery schools in Leningrad, Riga, Minsk, Brest, Tyumen and other cities.

[Question] A healthy toddler means a healthy school child. Today we can speak of the new prospects, which have made it possible to take an appreciable step forward to improve medical care of children and adolescents who are already in school and getting ready to work.

[Answer] Of course. Our goal is to rear a healthy generation of Soviet workers. Dispensary supervision is mandatory for all school children. Prevention still plays the leading role. Nor can one disregard health education for children and parents. And, as stated in the decree, there should be campaigns for development of active recreation, mass scale physical culture and athletics, as well as hiking [tourism].

Unfortunately, there are more than a few isolated instances where adolescents smoke and consume alcohol. Physicians and educators must wage a particularly forceful battle against this evil.

The USSR ministries of health and education have traditionally maintained close working contact. At the present time, we are jointly outlining steps for substantial improvement of physical development of school children and protection of their health. The goal is clear--as many graduates from school as possible should have no restrictions for health reasons in choosing their careers. In this respect, the decree opens up additional opportunities, since it makes it mandatory to expand the network of suburban pioneer [scout] camps, erect the most elementary athletic equipment and space for sports, increase production of children's special furniture. All of this constitutes extremely important elements in the struggle for a healthy child.

[Question] We know how important wise nutrition is to child development. The decree provides for expanded production of foodstuffs for children and dietetic foods....

[Answer] Yes, this is very important. Physicians devote much attention to optimum nutrition of children of all ages. Recently, there has been expansion of production of various formulas [mixtures] for infants; recommendations have been worked out for nutrition in nursery schools and regular schools. We should like them to be taken into mandatory consideration in all such facilities.

[Question] Apparently, all of us are entitled to expect medical scientists to make a substantial contribution to implementation of the new decree.

[Answer] Of course. In our country there are 26 scientific research institutes of pediatrics, obstetrics and gynecology, mother and child care, and more than 500 chairs [departments]. In 1980 the first section of the All-Union Center for

Mother and Child Health Care was opened in Moscow; it is called upon to coordinate scientific research. Similar centers have opened in Kiev and Kishinev.

The USSR State Committee for Science and Technology, USSR Academy of Medical Sciences and USSR Ministry of Health have approved a national program of scientific research up to 1985, which consists in essence of development of effective methods of disease prevention and treatment of mothers and children. All of the research centers of our country are participating in implementation of this program.

No doubt, the 11th Five-Year Plan will become an important stage of further development of public health care.

10,657  
CSO: 1840/438

## PSYCHOLOGICAL TRAINING FOR FIREMEN

Moscow TRUD in Russian 13 Aug 82 p 4

[Article by Yu. Yudin: "Before Entering the Fire"]

[Text] A system of psychological training for firemen has been established in Krasnoyarsk.

Krasnoyarsk... Greedy tongues of flames dance directly in front of the protective helmet. Even through the thick "armor" of the heat-reflecting uniform that resembles a cosmonaut's suit, the fury of the fire can be felt raging around me. I cannot slow down. Quickly, I must penetrate the wall of fire. Two minutes of work with the foam sprayer and the path is clear. I try not to lose sight of the division commander, Nikolay Banayev, walking in front of me. His heat-reflecting uniform gleams with silver and serves as a point of orientation. Now we must make our way through the smoke-filled basement of a burning apartment building to find and save a person.

I pull on the protective oxygen-isolation anti-gas mask (abbreviated as KIP), turn it on and dive into the thick column of smoke pouring from the basement. Here my ears are struck by the roar of the raging fire. We walk blindly for several seconds and then we are in the burning building. I rush to one side and then the other. Unaccustomed to the protective equipment, I tire quickly; sweat is running down my face in streams, the ten kilogram KIP seems to be twice as heavy... And then two firemen emerge from the smoke carrying a person in their arms. Now we need to leave even more quickly.

"Great job, boys," says Captain V. Gorkovenko, having observed our work. "You handled your assignment."

Well now I will reveal what really happened. There was no burning building. An ordinary mannequin played the role of the victim. The flames and smoke were real and raged just as they would in an actual fire. All this took place at an instructional proving ground of the Krasnoyarsk Fire Protection Department, in a course for psychological training of firefighters.

N. Semenov, assistant director of the Fire Protection Department's Fire Extinguishing Headquarters of the Krasnoyarsk krayispolkom Department of

Internal Affairs, speaks about the role all this plays in training firemen.

"No matter how paradoxical this seems, scientific and technical progress has added noticeably to the worries of fire protection workers. Now firemen often must act in unusual conditions: fighting a fire in a high building, or just the opposite, deep underground. We must be ready for such situations."

"The psychological training course has models of all the difficult conditions that we must deal with in fires. The course helps us accomplish two tasks: we can teach the novices how to work in a special outfit and use the proper techniques; we can also prepare them psychologically to act in unusual situations. In other words, here firemen undergo testing for occupational fitness."

"It would be wrong to think that it is enough for a fireman to have excellent health and nerves of steel. He must understand the technology of the equipment entrusted to him as well as any engineer; he must know how to work with automatic equipment; he must remember all the standards and regulations of fire safety set up in the national economy; when seconds are numbered he must be able to climb an emergency ladder to the top floor of a burning building; and he must be in complete control of all contemporary means of extinguishing fires; he must also know how to handle clerical work..."

...Instruction is finished. Our battle ammunition is hidden away in cases, the KIPs are lined up in a row. Taking advantage of a short break, the fellows from the Evgeniy Vorontsov station, with whom I recently walked through a fire, recall various episodes from their practice. Listening to them, I thought of how these fellows will act as selflessly and decisively when they step into combat with any fierce fire as they did here in their exercises.

9967  
CSO: 1840/445

## RESOLUTION ON IMPROVING HEALTH CARE IN USSR

Moscow TRUD in Russian 26 Aug 82 p 1

[Article: "In the CPSU Central Committee and the USSR Council of Ministers"]

[Text] The CPSU Central Committee and the USSR Council of Ministers have adopted a resolution "On Additional Measures for Improving the Health Care of the Population".

The resolution states that specific work is to be carried out by party and Soviet organs, health care agencies, ministries and departments, and social organizations to implement the decisions made at the 26th Party Congress by the CPSU Central Committee and the USSR Council of Ministers concerning questions of health care.

Thanks to the extensive socio-economic measures in the field of health care taken by the party and the government, positive results have been attained in the health status of the Soviet people. The material-technical base of health care has been developed significantly. The network of hospital institutions grew by 243,800 beds between 1978 and 1981 and now consists of 3,384,000 beds. Outpatient-polyclinic institutions were constructed to accommodate 481,600 visits per shift; 1,240 rural outpatient clinics were organized. More than 190,000 physicians and 508,000 middle level medical personnel were trained in our educational institutions.

The quality of organization of medical aid has improved in the first links of the health care system--the polyclinics, the first aid and emergency medical institutions, district hospitals and rural outpatient clinics. Laboratory techniques and medical equipment and instruments are being utilized more widely in patient evaluations. Territorial therapeutic and pediatric medical divisions are being reorganized into smaller units, and their staff of physicians has been increased. Health care institutions have started paying more attention to implementing disease prevention measures.

Specialized medical care has received further development. Cardiology services have been established. Measures are being taken to improve health care for women and children. The system of training medical personnel and raising their qualifications is being improved. Scientists have developed

new methods for diagnosis and treatment that are being applied more and more broadly in medical institutions.

It is also noted in the resolution that the possibilities for improving the medical care received by the population are far from being fully realized. Shortcomings in the organization of work in hospitals, polyclinics, rural outpatient clinics, first aid institutions and disease prevention are being eliminated slowly. Scientific research in the field of disease prevention has not received the necessary development. The initial links in the health care system are not provided with sufficient up-to-date medical equipment.

USSR ministries and departments and the republic Councils of Ministers are not implementing fully the complex plans for medical-sanitation arrangements. Assignments for construction of new health care units are not being completed on time. The demand in health care institutions for a number of medicinal drugs is not being met completely, and there are violations of time deadlines in the supply, distribution and utilization of the medicinal substances that are available.

Many ministries and departments are not meeting their obligations in terms of supplying health care institutions with some medicines, technical medical equipment, and medical vehicles. Production of special children's food products is growing at a slow rate.

The USSR Ministry of Health, local party and Soviet organs have not eliminated serious deficiencies in their work with medical personnel. There are instances of medical personnel violating their professional obligations, which justifiably elicits complaints from the population. Necessary measures are not being taken to reinforce medical personnel and to establish for them the necessary working and everyday living conditions.

Considering work toward further improvement in health care of the population as one of the most important social tasks set by the 26th Party Congress, the CPSU Central Committee and the USSR Council of Ministers have made the republic Communist Party central committees, kraykoms, obkoms, the Councils of Ministers of union and autonomous republics, ispolkoms of kray and oblast Councils of People's Deputies, ministries and departments responsible for continuing the work set forth in the resolution of the CPSU Central Committee and the USSR Council of Ministers "Measures for Further Improvement of the People's Health Care". These organizations were also given the responsibility of ensuring, in cooperation with trade union, komsomol and other social organizations, implementation of additional measures to perfect the organization of medical care for the population.

Attention should be concentration on further efforts for disease prevention, prevention of traumatic injuries, sanitation of environmental conditions, improvement of working, leisure, and living conditions, and instilling in the Soviet people a conscious approach toward protecting and strengthening their health. Additional measures should be taken to carry out the plans set for construction and prompt completion of hospitals, polyclinics, outpatient

clinics, pharmacies, enterprises for repair of medical equipment and other health care items, as well as enterprises of a medical-industrial nature. Improving the selection of personnel who direct health care, strengthening the education of medical personnel, increasing their responsibility for carrying out professional and official duties, for the quality and level of medical care provided to the population, are all steps that should be taken. Violations of the physician's oath of the Soviet Union should be eliminated decisively, as should inattentive and callous treatment of patients and utilization of an official position for mercenary purposes. The open, public nature of activities in health care institutions should be maintained; there should be systematic evaluations of their directors open to the public; activities of health care agencies should be discussed in party and Soviet organizations. Measures should be taken to establish proper working and living conditions for physicians, middle level medical personnel and pharmaceutical workers, especially those working in rural health care institutions.

With the goal of improving work effectiveness in protecting the health of the population, preventing disease, prompt diagnosis, effective treatment and restoration of the working ability of patients of cardiovascular, oncological, pulmonary, endocrine, nervous, and other diseases, we suggest the following to the USSR Ministry of Health and the republic Councils of Ministers:

establish measures in rural areas to improve health care management; expand the network of outpatient clinics; develop emergency medical care facilities.

strengthen preventive work in outpatient-polyclinic institutions; organize preventive health care departments in large polyclinics; improve the continuity of work in treatment and prevention institutions,

improve the quality of preventive examinations and health care for the population, first and foremost for women and children; develop a network and improve the work of medical-genetic counseling; strengthen treatment and recovery work with adolescents and youth.

improve medical services for children in pre-school institutions, directing special attention to maintenance of a systematic observation of the children's health status and taking sanitation measures.

organize, in the 11th Five-Year Plan and in the following years, consultation-diagnostic polyclinics (departments) in facilities of medical higher education institutions, scientific research institutes and large multi-departmental hospitals.

ensure implementation of regular consulting hours for the general population in territorial polyclinics and medical-hospital units by highly qualified specialists from medical higher education institutions and scientific research institutes, along with visits by these specialists to rural treatment and prevention institutions.

between 1983-1987, implement in republic, kray and oblast hospitals organization of long-range diagnostic offices (centers) for diagnosis of cardiovascular diseases, equipped with the necessary equipment.

strengthen the activity of government sanitary inspections, primarily in agricultural production and industrial hygiene, systematically improve sanitary-hygiene regulations and standards; take measures to strengthen rural sanitary-epidemiological stations and establish for them inter-regional laboratories.

The resolution makes the USSR Ministry of the Medical Industry and the Ministry of Health responsible for ensuring a significant growth in production and regular supply of widely used medications, as well as for meeting the demand for them from health care institutions and the population more completely. Measures should be taken to increase the production of medicinal drugs in packages that are convenient to use in treatment. Directors of enterprises should have more responsibility for fulfilling production plans for medications that are in the established list of medications, and in accordance with the agreed-upon obligations for supplying them. There should be further expansion of the network of pharmacies and their work should be improved by increasing the number of mobile pharmacies, and rational utilization of medical resources. There should be increased production of low-mechanization means to improve patient service and ease the work of medical personnel in treatment and prevention institutions.

The USSR Ministry of Higher and Intermediate Special Education and the Ministry of Health have been assigned the task of implementing additions to educational plans and programs in higher and intermediate medical education institutions, keeping in mind improvement of the students' practical training in the instruction process.

USSR ministries and departments and republic Councils of Ministers have been granted the right to permit directors of sovkhozes and other agricultural enterprises and organizations and also to suggest to kolkhozes, to turn over any awards they receive for work results for the year to medical workers of rural district hospitals, out-patient clinics, physician's assistant-midwife centers and treatment-recovery and preventive care centers, who have succeeded in improving their health care work and have lowered the incidence of illness among workers. They should utilize the material incentives fund of the enterprise (organization) or kolkhoz.

For 1983-1985, the republic Councils of Ministers have been assigned the task of ensuring expansion of the network of first aid and emergency medical service stations and substations.

As of 1 January 1984, there will be additional advantages for middle-level medical personnel on the stations' (departments') mobile teams of first aid and emergency medical service, medical aviation stations, and departments of scheduled and emergency consultation (payment of monthly bonuses for a continuous period of work in these positions, and an additional three days off).

USSR ministries and departments and republic Councils of Ministers are permitted new construction, expansion, and reconstruction of existing maternity homes, women's consultation offices and children's polyclinics, at the expense of capital investments designated for construction of production units.

The USSR Ministry of Health and the USSR Academy of Medical Sciences, together with the republic Councils of Ministers, ministries and departments, and the All-Union Central Council of Trade Unions and the Komsomol Central Committee, have been assigned the task for 1983-1984 of working out a complex program for reinforcing disease prevention and strengthening the health of the population, in accordance with Gosplan, the State Committee for Science and Technology, and the State Committee on Labor and Social Issues. They must implement the plan by 1990. Further improvement in working conditions and protection should be provided for, along with medical-sanitation measures directed at lowering the rate of temporary incapacitation, occupational illness, industrial traumatic injuries and disabilities. There should also be improved sanitation of the environment, activation of work directed at hygiene education for the population, reinforcement of measures for exerting a social influence on people who abuse alcohol and further steps in the battle against other harmful habits which decrease working capacity and are injurious to one's health. It is also important to develop forms of active relaxation for the population, implementing physical conditioning and sports activities, increasing the effectiveness of utilizing treatment-recovery and preventive centers, tourist and physical conditioning-sports centers, and other health-promoting institutions.

The USSR Ministry of Health and the USSR Academy of Medical Sciences, with the participation of the USSR Academy of Sciences, are advised to expand between 1983-1985 scientific research on the reasons for the incidence of cardiovascular, oncological, pulmonary, endocrine, neuropsychical and other diseases in various climate-geographical zones, and also on development of the scientific foundations for their primary prevention, effective methods of early diagnosis and treatment, and strengthening the health of children and adolescents.

To ensure mass preventive examinations and preventive health care for the population, early detection of disease and treatment of patients, the resolution stipulates that measures be taken for development and practical implementation of methods and means of medical microanalysis, increased production of instruments and reagents for carrying out up-to-date clinical-biochemical research, and development of production of the necessary laboratory equipment. The corresponding ministries and departments have been given the responsibility for ensuring proper health care in terms of specialized medical transportation, dispatching equipment, medical technology for equipping first aid and emergency medical services and outpatient-polyclinic institutions. The USSR Ministry of the Meat and Dairy Industry and the USSR Ministry of the Food Industry have been assigned the task of increasing production of dietetic products and special children's food products.

The CPSU Central Committee and the USSR Council of Ministers assigned USSR ministries and departments, republic Councils of Ministers, together with the All-Union Central Council of Trade Unions, central committees and councils of republic trade unions, the task of increasing the responsibility of directors of enterprises, organizations and institutions for strict observation of sanitary regulations and standards, working safety standards, and for carrying out sanitary measures directed at further improvement of the working and leisure conditions of their workers, paying particular attention to following standards of hygiene in planning and construction of rural population centers. They should raise the role of work collectives in the battle against harmful habits, especially alcohol and smoking; they should strengthen their work toward establishing a positive moral and psychological climate at their enterprises, institutions and organizations. In their plans for socio-economic development of the enterprises, they should provide for measures to improve disease prevention and strengthen the health of their workers, and also further decrease the rate of industrial accidents and occupational illness. They should ensure further expansion of the network of suburban dachas for urban pre-school institutions, children's homes and pioneer camps. At school and pre-school institutions and pioneer camps, there should be simple sports equipment and playing areas. There should be an increase in the production of special furniture for pre-schools, schools, and occupational-technical schools, as well as small-scale technical equipment, instruments, training devices, and other equipment necessary for educational-production practice.

The ministries, departments and social organizations concerned have been made responsible for reinforcing the work of disseminating hygiene information and practices, especially among children and adolescents; they should also adopt measures to improve training of medical personnel and lead more of them toward preventive health care practices, and activate participation in hygiene education of the population through television, radio, films, and institutions for cultural enlightenment.

In order to coordinate the activities of the ministries, departments and social organizations in disease prevention and strengthening the health of the population, an interdepartmental council has been established under the USSR Ministry of Health. The council will aid in the development and implementation of the appropriate measures, and in the generalization and dissemination of the accumulated experience in the field.

The CPSU Central Committee and the USSR Council of Ministers express firm confidence in the fact that the republic, kray and oblast Communist Party central committees, the republic Councils of Ministers, ispolkoms of kray and oblast Councils of People's Deputies, ministries, departments, trade union, komsomol, and other social organizations, and all health care workers will ensure the successful realization of the decisions of the 26th CPSU Congress, the November (1981) and May (1982) Plenums of the CPSU Central Committee, and will take the necessary measures to reinforce disease prevention and strengthen the health of the population and prolong the active, creative lives of the Soviet people.

## EXPORT OF MEDICAL PRODUCTS DISCUSSED

Yerevan KOMMUNIST in Russian 4 Aug 82 p 3

[Interview with Mikhail Vasil'yev, general director of "Medeksport", by Yuriy Andreotti, APN [Novosti Press Agency] correspondent; "International Ties--'Medeksport' is Supplier"; date and place not specified]

[Text] In more than 80 countries in the world, medications, medical instruments, and hospital equipment made in the Soviet Union and exported by the international trade association "Medeksport", are well known.

In recognition of the services performed by "Medeksport", that association has received an award, the honored international prize "Golden Mercury". APN correspondent Yuriy Andreotti conducted an interview with the general director of "Medeksport", Mikhail Vasil'yev.

[Question] The "Medeksport" association is relatively young. It entered the world market with its medical products only 20 years ago. How is trade going?

[Answer] In the last 10 years our commodity circulation has increased by 10 times and has reached 1 billion rubles per year. Soviet export is supported by the huge medical industry, which consists of more than 200 enterprises, scientific research institutes, and sovkhozes that grow medicinal plants. Today our factories produce more than 5000 types of apparatus, equipment, instruments, and medicinal substances with approximately 2000 different designations. We offer more than 3000 pieces of medical equipment and instruments for patient treatment in various countries of the world.

[Question] What do we supply to our foreign customers and how do you explain the ever-increasing demand for the products of "Medeksport"?

[Answer] Our foreign customers are assured, first and foremost, of the high, guaranteed quality of Soviet medical products.

Much of our exported apparatus has no analogs in the rest of the world. They have been recognized also by gold medals awarded at international fairs and

exhibitions. This is the case, for example, with "Elektroson", a device which relieves insomnia without medication; and "Urat", a noninvasive means of breaking up stones in the urinary bladder. "Urat" is now being replaced by the newest urological complex, "Baykal-2", which can destroy and eliminate stones in the ureter without surgical intervention.

We should make special note that in the list of products available from "Medeksport", in addition to ordinary, everyday items that are needed in every home, such as a medical thermometer (we supply 4 million of them per year), the newest, complicated equipment and instruments also occupy an important place. For instance, the laser surgical device "Skal'pel'" is a new piece of equipment; with the aid of the device, an operation can be performed with an extremely sharp laser beam instead of a traditional surgical knife. Although the laser beam can cut through tissues, very little blood leaks out since the beam simultaneously "sutures" the blood vessels. The possibility of infection is reduced to a minimum. There is another device from the laser family--the "Yatagan". It is intended for microsurgery on the eye. Using the extremely finely focused beam of the "Yatagan", one can perform an operation to treat glaucoma and remove cataracts without opening the eyeball. There is practically no probability of subsequent complications. The device is patented in England, the GDR, Canada, the USA, France, the FRG, and Switzerland.

Original surgical suturing apparatuses have been among the popular Soviet export articles for many years. In the last 3 or 4 years there has been a marked increase in their sales. This is natural. The apparatus we make form airtight, lasting, aseptic sutures. Thanks to these devices, patients lose less blood, and the time spent on the operation is reduced to one-half to one-third the normal amount. They have become reliable helpers for surgeons in over 40 countries.

[Question] Our country also exports prepared medications. What is the rate of growth in this area?

[Answer] We send more than 400 different drugs in prepared form beyond our borders. Almost 50 enterprises work to supply these drugs for export. Our customers are most interested in our antibiotics, sulfamide drugs, anti-pyretics, vaccines, and sera.

[Question] What new items for a world pharmacopeia were developed in our country?

[Answer] It is difficult to give precedence to one drug over another. Every new means of relieving suffering is worthy of note. But I'll start with sulfalene. It is from the group of super long-acting drugs: it leaves the blood only after 65 hours. It reaches all the body tissues and fluids, curing a broad spectrum of illnesses: respiratory tract infections, urinary bladder diseases, inflammatory processes encountered in obstetric-gynecological practice, pyoderma, and trachoma. It has also been shown to be effective against otitis, sinusitis, and malaria.

For treatment of malignant neoplasms, an original drug has been developed--prospidin. It is an effective treatment for cancer of the larynx. A beneficial effect has been observed in lung and urinary bladder cancers. It turns out that prospidin can arrest the growth of primary tumors and metastases, reducing their size all the way up to complete resolution. It also has an anti-inflammatory effect.

Among the almost 30 anti-tumor drugs offered by "Medeksport", one deserves special mention. It is one of the most effective drugs of our time--phthoratur. It has been used for a number of years in successfully treating tumors of the gastro-intestinal tract, and breast and ovarian cancers. Phthoratur has become very well known abroad; it is registered in 15 different countries. Before all this, it underwent thorough testing in the USA National Cancer Institute, in the National Cancer Center in Japan, and in clinics in the FRG.

The psychotropic drug mebicar is one of the new Soviet export products. It relieves anxieties, fear, internal tension, and stresses of neuroses and psychoses. Mebicar differs from well-known tranquilizers such as seducsen, elenium, and tazepam, in its low toxicity. Mebicar's toxicity is almost 1/200 that of seducsen.

Another interesting drug is being readied for export--anabazin. It is of plant origin and is used to ease smoking cessation. "Medeksport" specialists believe that anabazin will find many buyers, since millions of people would like to quit smoking. Tests have shown that anabazin helps approximately half of its users quit smoking in 5 to 8 days.

[Question] Our country occupies a visible position in the export of products that are so-called exotic medicine. Just what products of this sort does "Medeksport" offer?

[Answer] In just the last 5 years, the sales volume of products of this sort has increased by 40 percent. The largest demand is from the markets of Southeast Asia; for example, antlers (horns) of rare spotted deer are used there.

The Soviet Far East is the only region in the world today where the wild "root of life"--ginseng--grows in natural conditions and can be obtained. For centuries it has been valued in all countries. Eleutherocock also grows there. This plant belongs to the same family of Araliaceae as ginseng. It stimulates the user's working capacity, raises mental possibilities, sharpens vision and hearing, increases resistance to various effects of a physical and biological nature. With its help, a person can better tolerate heat and cold, anti-cancer treatments, and viral infections.

9967  
CSO: 1840/416

## NEW MOLDAVIAN HOSPITAL COMPLEX DISCUSSED

Kishinev SOVETSKAYA MOLDAVIYA in Russian 28 Jul 82 p 3

[Article by A. Musorina, chief of the USSR Ministry of Health Department of State Expertise on Planning and Estimates: "Competition for the Moldavian SSR State Prize--A Unique Complex"]

[Text] One of the main tasks of Soviet health care is to bring the levels of medical service for urban and rural populations closer together. Specialized republic centers have been called upon to carry out this task; they guarantee the rural population high quality medical care, both at the hospital and consultation levels. There is a complex of this sort in Moldavia. It is the 1000-bed Republic Clinical Hospital.

The complex was conceived and built with a creative scope, large and expressive. Its obvious merit lies in the utilization of ordinary, relatively low-cost finishing materials and construction.

The planning and construction were carried out under complicated conditions: seismic activity, porous foundations, sharp contours, all required special engineering measures, construction and design solutions.

A centralized block method was used as the basis for the architectural and technological solution, combining auxiliary departments of the same type. Technical equipment was built into the design and located close to the unit it serves. All this contributed to the continuity of the architectural, technological and engineering solutions, simplified functional connections, and gave the complex an architectural, artistic expressiveness and laconism.

The unity of the solution is undoubtedly explained by the fact that the development and realization of the design was carried out by a single group, consisting of the project's chief architect, V. V. Baklanov, architect S. E. Yakhnenko, and design engineer P. A. Bezrodnyy. The hospital's chief physician, T. V. Moshnyaga, took an active role in the planning and construction, from beginning to end, as client and supplier; this contributed to the quality of the project's realization.

The composition of the complex is represented by a series of buildings united by underground tunnels. This device allows complete isolation of the

housekeeping zone; the landscape's step-like contours were utilized to create separate entrances into the buildings at all five floors.

All these divisions of the numerous and varied functions take on extreme importance if one considers that in the finished complex at one time there can be up to 2000 patients, 4000 staff personnel, students, instructors, interns and visitors.

The main, and largest, building consists of the 1000-bed hospital with its auxiliary departments, polyclinics, administrative wing and admitting department. It is arranged so that both vertical and horizontal connections are reduced to a minimum distance.

This is very important for large clinics, where reducing the time the staff spends going from one place to another can be of serious consequence.

The basic subdivision of the hospital--a section--has 40 beds, placed in 4, 3, 2, and 1-bed wards. Two duty nurses at a time serve one section. The distance between the nurses' post and the doors of the farthest ward is never more than 15 meters.

The centralized surgery block, with clearly divided zones, has aroused much interest. The resuscitation unit is located here. Large domed operating rooms have been designed well, providing an opportunity to observe the course of an operation from the teaching rooms above.

The spirit of innovation pervades the ideas used in working out the ward divisions. The main problem here was approximating everyday conveniences within the format of the patients' accommodations, striving to make them familiar and homey--this is not an insignificant factor in the treatment process. Wards facing a park, porches with lounge chairs, refrigerators, built-in closets, convenient means of communication between patients and the duty nurse and relatives (videotelephones), bedside lamps with individual controls, specially selected furniture, colorful and practical wall paint in the wards, quiet and durable floor covering of linoleum on top of a fabric base, bright colors in the hallways that contrast with the furniture--all this creates an atmosphere of auditory, color, and psychological comfort.

We should note that an effort is made internally, just as it is externally, to eliminate unnecessary details. In the wards and large rooms, instead of ordinary radiators, concrete heating panels built right into the walls are used. In the lobbies, foyers, and staff cafeteria, heated floors are used in place of other heating equipment. All this produces an effect of spaciousness and has a positive emotional effect on people.

The problem of control in this large complex is dealt with by architectural-design methods, reducing distances and utilizing contemporary means of communication: intercoms between wards, city and hospital telephone terminals with an overall capacity of 650 numbers, and videotelephones.

In the engineering maintenance of the hospital, all the possibilities of our country's industry are put into practice. The complex is fitted with contemporary medical equipment. This allows the hospital to guarantee the highest level of treatment.

There is one more extremely important factor: the Republic Clinical Hospital complex has the ability, with the passage of time, and according to the rate of growth in the republic's population, to increase its number of beds. This increase will be provided for by the successive construction of 3 ward wings with 350 beds each, bringing the future capacity of the complex to 2000.

We should emphasize that the successful design was implemented very well by the "Grazhdanstroy" trust construction organizations in cooperation with installation organizations of the "Elektromontazh", "Santekhmontazh", "Prodmontazh", and "Promsvyaz" trusts, in addition to a number of other enterprises in the republic.

Moldavia has received a unique medical center, where the best medical care today is made available to the republic's workers. The authors of the project and the builders have made a huge contribution to the development and improvement of the most progressive health care and urban construction trends.

9967  
CSO: 1840/421

UDC 614.2:519.24

FUNDAMENTAL TRENDS AND TASKS IN DEVELOPMENT AND USE OF DATA PROCESSING IN PUBLIC HEALTH IN 11th FIVE-YEAR PLAN

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSIYI in Russian No 7, Jul 82  
(manuscript received 11 Mar 82) pp 3-8

SERGEYEV, G. V., RSFSR deputy minister of health

[Abstract] Plans are outlined for the further implementation and expansion of data processing and information retrieval in the public health sector of the RSFSR in the 11th Five Year Plan. The acquisition of new data processing capabilities will encompass its use in clinical situations, medical research, epidemiologic surveys, and in the administration of health care delivery systems. Particular attention is accorded to the training of computer experts to meet the growing need for such expertise in the RSFSR.  
[414-12172]

UDC 613,644

MATERIALS FOR SETTING MORE PRECISE HYGIENE STANDARDS FOR GENERAL TRANSPORTATION-TECHNOLOGIC VIBRATION

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 7, Jul 82 (manuscript received 4 Sep 81) pp 1-4

PAL'TSEV, Yu. P., SYROMYATNIKOV, Yu. P., VYALOV, A. M., ABRAMOVA, E. M., SHABOLINA, T. A. and SINEVA, Ye. L., Institute of Hygiene imeni F. F. Erisman, Moscow

[Abstract] Vibration studies were conducted at iron quarries, open-cast coal mines and fuel-and-energy complexes for the purpose of gathering material for revision of hygiene standards in accordance with State Standard 12.1.012-78. Biological parameters investigated included rheographic index, duration of anacrotism, duration of catacrotism, sphygmographic acceleration and coefficient of tonic pressure during noise and vibration. Physical conditions for

excavator operators during work were also modeled in an acoustic chamber using 10 healthy subjects aged 20-39. The findings showed that the degree of vibration depends on the hardness of the rock being processed and the nature and duration of excavator operation. Low frequency vibration at 4 Hertz at 108dB adversely affects cerebral hemodynamics. Moderately heavy work is safe when the vibration level at working places does not exceed a limiting range of 92. References 4: 3 Russian, 1 Western.  
[8-9642]

UDC 613.68

#### LEVELS OF PHYSIOLOGICAL RESERVES IN SEAMEN WORKING 10-HOUR WORK AND REST SCHEDULES

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 7, Jul 82 (manuscript received 23 Oct 81) pp 4-7

YEVSTAF'YEV, V. N., SHAFRAN, L. M. and NETUDYKHATKA, O. Yu., Odessa Branch of the Institute of Hygiene of Water Transportation

[Abstract] Studies were conducted on 252 seamen of the Latvian and Black Sea fleets to determine the physiological effects of work on a 10-hours-on-10 1/2-hours-off work and rest schedule. Functional tests, including short-duration measured physical stress, were used to determine the level of physical work capacity, maximum oxygen demand, step-test index, and respiration. The EKG was recorded constantly throughout testing. A control group operated on an 8-hour working schedule. The findings showed that during a voyage some of the indexes characterizing work capacity decreased but improved toward the end of the voyage, indicating an improvement in physiological reserves. Comparison of findings in the experimental group with those in the control group showed no significant differences in the level of physiological reserves. References 10 (Russian).

[8-9642]

UDC 613.6;I629.73;658.284

#### CONDITION OF CARDIOVASCULAR SYSTEM IN AIR TRAFFIC CONTROLLERS BASED ON STUDIES DONE AT WORKING PLACE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 7, Jul 82 (manuscript received 6 Jan 82) pp 40-41

AVETIKYAN, Sh. T. and KAN, Ye. L., Scientific Research Institute of Neurosurgery, Leningrad

[Abstract] Current concern about the health of air traffic controllers working under great stress while being forced to make rapid decisions, and

lack of published data on the subject prompted a study of residual changes (at the end of the work shift) in the cardiovascular system in air traffic controllers following work of varying intensity. Pulse rate and arterial pressure were measured in 154 air traffic controllers at the start and end of work shifts at two different airports in the USSR. Mean age of subjects was  $30.5 \pm 1.1$  years and mean length of service was  $6.4 \pm 0.6$  years. Statistical processing of findings (dispersion analysis) showed that no changes occur with a work load of up to 20 aircraft per hour, and only minor changes are seen with a work load of 30-40 aircraft per hour. The figure of 40 aircraft per hour was determined as the lower optimal boundary for the shift work load; above this level residual changes were seen in arterial pressure.

References 3 (Russian),

[8-9642]

RADIATION BIOLOGY

UDC 577.391:547.963.3

COMBINED EFFECTS OF HYPERTHERMIA AND 8-BROMOCOFFEEINE OR ACTINOMYCIN D ON  
POSTRADIATION DNA REPAIR IN MAMMALIAN CELLS

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 14 May 80) pp 326-329

REZVAYA, S. P. and KHANSON, K. P., Central Scientific Research  
Roentgeno-Radiologic Institute, USSR Ministry of Health, Leningrad

[Abstract] Using an in vitro system involving LL cells, studies were conducted on the effects of hyperthermia alone and in combination with 8-bromocaffeine (BC) or actinomycin D (AC) on the repair of radiation (50 Gy) damaged DNA. The results showed that following X-irradiation essentially equal degrees of repair were seen at 37 and 41°C, but that at 43°C repair did not take place. Addition of BC ( $10^{-4}$  M) or AC (20 µg/ml) at 41°C slightly raised the level of repair to equal that seen at 37°C, whereas addition of BC or AC at 37°C depressed repair. Addition of either BC or AC at 43°C significantly increased the level of DNA repair. The facts were interpreted to indicate that hyperthermia favors DNA repair prior to the interaction of BC or AC with the damaged portions of the DNA. Figures 1; references 14: 10 Russian, 4 Western.

[441-12172]

UDC 577.391:547.963.3:521.21

SYNERGISTIC EFFECTS OF  $\gamma$ -RADIATION AND RADIOTOXINS. PART 2.  
DIFFERENTIATION, DNA SYNTHESIS, AND CHROMOSOMAL ABERRATIONS

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 10 Jun 80) pp 348-351

KUZIN, A. M., MEDVEDKOVA, V. V., VAGABOVA, M. E. and IVANOVSKIY, Yu. A.,  
Institute of Biological Physics, USSR Academy of Sciences, Pushchino

[Abstract] Studies were conducted on the combined effects of low level gamma irradiation and exposure to potato tuber radiotoxin on sunflower leaf

formation, DNA synthesis in corn rootlets, and chromosomal aberrations in V. faba meristem cells. The results indicated that treatment with the radiotoxins potentiated the effects of gamma irradiation, which suggests that normally the effects of radiation are amplified by the consequent production of radiotoxins in plants (and presumably animals). Figures 1; references 8: 7 Russian, 1 Western.  
[441-12172]

UDC 577.391:612.039.58

RADIOPROTECTIVE EFFECTIVENESS OF POLYRIBOINOSINIC-POLYRIBOCYTIDILIC ACID (POLY I-POLY C). PART 1. POLY I-POLY C-MEDIATED PROTECTION OF HEMATOPOIETIC SYSTEM AND SURVIVAL OF IRRADIATED ANIMALS

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 13 Feb 80) pp 358-362

ZHUKOVA, N. A., PALYGA, G. F. and MAKSIMENKO, A. A., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk

[Abstract] A single intraperitoneal administration of poly I-poly C (2.5 mg/kg) two days prior to gamma irradiation (6.5-8 Gy) of (CBA x C57Bl)F<sub>1</sub> mice increased the survival rate and diminished hematologic manifestations of radiation sickness. Treatment of x mice exposed to 7.5 Gy had no effect on postirradiation changes in hematopoiesis although the survival rate still exceeded control values. Consequently, it appears that poly I-poly C-mediated radioprotection was not due to its direct effect on the bone marrow, but apparently involves other mechanisms such as induction of interferon synthesis, enhancement of phagocytosis, etc. Figures 2; references 18: 10 Russian, 8 Western.

[441-12172]

UDC 577.391:612.039.58

MECHANISM OF RADIOPROTECTIVE ACTION OF  $\beta$ -MERCAPTOETHYLAMINE MEDIATED BY CYCLIC NUCLEOTIDES

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 11 Feb 80) pp 363-367

NIKOL'SKIY, A. V., ARIPOV, Sh. M., PUSHKAREVA, N. B. and ROMANTSEV, Ye. F.

[Abstract] Investigations on the mechanism of action of  $\beta$ -mercaptoproethylamine (MEA) as a radioprotective agent showed that within 15 min of its administration to (CBA x C57Bl)F<sub>1</sub> mice (150 mg/kg, i.p.) hepatic adenylate cyclase activity was activated and cAMP increased 2.7-fold and cGMP 1.5-fold, i.e.,

there was a net increase in the cAMP/cGMP ratio. Administration of MEA to animals pretreated with the beta-blocker propranolol (10 mg/kg, s.c.) diminished the effects of MEA on hepatic cAMP levels. Furthermore, both MEA and epinephrine activate the cyclase in vitro. Since radioresistant tissues are known to possess high cAMP/cGMP ratios, while elevation of cGMP is known to lower radioresistance, it appears that elevation of cAMP elicits a release of a Ca-dependent protein regulator that favors nucleotide hydrolysis and accounts for the short duration of radioprotection of MEA and the return to essentially control cAMP and cGMP concentrations in 180 min. Figures 2; references 21: 5 Russian, 16 Western.  
[441-12172]

UDC 577.391:621.039.58

#### RADIOPROTECTIVE EFFECTS OF CYSTAMINE AND MEXAMINE IN TWO SUCCESSIVE MITOTIC CYCLES

Moscow RADIOPROTEKTIYA in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 25 Mar 80) pp 368-373

SIDOROV, V. P., All-Union Scientific Research Institute of Forestry Chemization, Pushkino, Moscow Oblast

[Abstract] Pretreatment of air-dried *Crepis capillaris* seeds with cystamine or Mexamine ( $10^{-2}$  M), followed by gamma irradiation ( $^{137}\text{Cs}$ , 200 r), protected against development of chromosomal abnormalities in the following two mitotic cycles. The radioprotective effects of cystamine and Mexamine were completely abolished by the addition of DNA synthesis inhibitor 5-amino-uracil (0.5  $\mu\text{g}/\text{ml}$ ), which suggests that the effects of cystamine and Mexamine are not due to a reduction of radiation-induced damage in the DNA, but to the formation of complexes with genetically-active loci on the chromosomal DNA. As a result of complex formation there appears to be at least a partial inhibition of the primary radiation-induced chromosomal damage. References 12: 9 Russian, 3 Western.  
[441-12172]

UDC 577.391:616-006

METRONIDAZOLE-INDUCED CHANGES IN TUMOR RADIOSENSITIVITY, OXYGEN TENSION, AND CELLULAR RESPIRATORY RATE

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 29 Jan 80) pp 374-378

YERMEKOVA, S. A., YESEL'BAYEVA, G. O. and KOPOSOVA, R. P., Kazakh Scientific Research Institute of Oncology and Radiology, Kazakh SSR Ministry of Health, Alma-Ata

[Abstract] Studies were conducted on the effects of metronidazole-mediated changes in the time course of radioresistance, oxygen tension, and respiratory rate of subcutaneously transplanted Pliss lymphosarcoma to outbred rats. Two hours after per os administration of metronidazole (100 or 700 mg/kg) a maximum increase in radiosensitivity was seen, which was correlated with a cellular level of 40-50 µg of metronidazole per gram of tumor cell protein, a 3-4 fold increase in oxygen consumption, a 3-fold tumor oxygen tension increase, and a 2-3-fold tumor volume decrease. The effects of metronidazole were apparent for four hours and related to the intracellular levels of this agent. References 14: 5 Russian, 9 Western.

[441-12172]

UDC 577.391;663.12/14;621.039.58

RADIOPROTECTIVE EFFECTS OF CYSTEAMINE IN WILD TYPE AND MUTANT YEAST STRAINS

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 18 Apr 80) pp 379-383

GIL'YANO, N. Ya., MALINOVSKIY, O. V. and KHARLAMOV, A. D., Institute of Nuclear Physics imeni B. P. Konstantinov, USSR Academy of Sciences, Leningrad

[Abstract] Cysteamine (CA) was tested for radioprotective effectiveness in wild type *Saccharomyces cerevisiae* and mutants defective in excisional and recombinational DNA repair. Evaluation of the survival rates after pretreatment with CA (0.01 M) followed by gamma irradiation revealed no significant differences between the wild type and mutant strains, indicating that the radioprotective mechanism did not involve enzymes functioning in DNA excision and recombination repairs. Consequently, the protective mechanism of action of CA in the eukaryotic yeast differs from that in the prokaryotic bacteria. Figures 3; references 18: 12 Russian, 6 Western.

[441-12172]

UDC 577.391:591.481.1:539.125.4

MORPHOLOGICAL CHANGES IN CORTICAL NEURONS IN RATS FOLLOWING EXPOSURE TO PROTONS OF DIFFERENT ENERGIES

Moscow RADIobiologiya in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 14 Aug 80) pp 384-389

KARPOVSKIY, A. L., FEDORENKO, B. S., RYZHOV, N. I. and SMIRNOVA, O. A.

[Abstract] Wistar rats were employed in a study to determine the effects of 50 and 645 MeV protons and  $^{60}\text{Co}$  gamma rays (1-6 Gy) on the cortical neurons over a 12 month period. The results showed that irreversible degeneration of neurons in the external granular layer encompassed 15.6-19.2% of the neurons after one month in the irradiated rats, and 37.6-51.4% after 12 months (the corresponding control figures did not exceed 2.5% at any time). Of the modalities tested, 50 MeV protons were shown to have the most damaging consequences in terms of the CNS. Figures 3; references 12; 8 Russian, 4 Western.  
[441-12172]

UDC 577.391:535-31:575.24

EFFECTS OF SHORT-WAVE UV IRRADIATION OF HeLa CELL CLONES ON FREQUENCY OF GENOME MUTATIONS

Moscow RADIobiologiya in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 1 Jan 80) pp 423-425

KUCHERYAVAYA, N. A., ZAVOL'NAYA, Ye. S., and VAKHTIN, Yu. B., Institute of Cytology, USSR Academy of Sciences, Leningrad

[Abstract] Exposure of 30 HeLa cell clones to short-wave (254 nm) UV irradiation ( $40 \text{ J/m}^2$ ) induced an increase in the number of clones with hypoploid mutations to  $2.56 \pm 0.30$  and with hyperploid to  $8.00 \pm 0.51$  clones, vs. corresponding control values in unirradiated clones of  $1.12 \pm 0.24$  and  $6.56 \pm 0.45$ . The increase in genome mutations of the HeLa cells after irradiation with 254 nm UV light was, therefore, 1.5-fold, Figures 2; references 7: 4 Russian, 3 Western.  
[441-12172]

UDC 577.391

NEW APPROACH TO DETERMINATION OF CORRELATION BETWEEN RADIRESISTANCE AND METABOLISM IN MAMMALS

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 3, May-Jun 80  
(manuscript received 31 Jan 80) pp 444-446

TYAZHELOVA, V. G., Institute of Biological Physics, USSR Academy of Sciences, Pushchino

[Abstract] Numerical data are presented which demonstrate that radioresistance in mammalian species can be ranked on the basis of the product obtained by multiplying the basal metabolic rate by the half-period of water metabolism. On the basis of such calculations the following sequence was derived for decreasing radioresistance: rat > mouse > guinea pig > dog > man. Figures 1; references 9: 7 Russian, 2 Western.  
[441-12172]

UDC 577.391

VARIATIONS IN CHARGED PARTICLE TRACK LENGTHS IN MICROOBJECTS IN RELATION TO IRRADIATION CONDITIONS

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 3, May-Jun 81  
(manuscript received 30 Mar 80) pp 467-470

SAVINSKIY, A. K. and CHERNOVA, O. N.

[Abstract] An approach is presented for the mathematical evaluation of the significance of geometric factors responsible for the release of energy by a charged particle as it traverses spherical and cylindrical microobjects serving as models of cells and subcellular structures. Consideration is given to the situations in which the spherical object is located in an isotropic field of charged particle tracks, in which the isotropic emitter is located on the surface of the sphere, in which the isotropic emitter is uniformly distributed within the sphere, and in the case of cylindrical objects in an isotropic field of tracks where the height:diameter ratio of the cylinder has the following values: 1:3, 2/3, 1/1, and 3/1. Figures 3; references 2 (Russian).  
[441-12172]

UDC 615.849.114.015.3+615.849.5

DOSIMETRY OF IONIZING RADIATION

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian Vol 27, No 4, Apr 82

KRONGAUZ, A. N.

[Abstract] A brief survey of world literature is presented on the various trends, definitions, and units currently employed in ionizing radiation dosimetry. The review ends with a note on the conversion to the SI units and a comment that the Soviet Union needs to develop dosimetric instruments and equipment to measure equivalent doses.

[415-12172]

UDC 577.391:538.122

MAGNETIC FIELD MODIFICATION OF X-IRRADIATION EFFECTS

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 35, No 5, May 82  
(manuscript received 21 Dec 81) pp 340-344

AMIRBEKYAN, V. A., AVAKYAN, V. A., POGOSYAN, G. M. and AGAMANUKYAN, A. Zh., Department of Complex Problems of Nature Protection of Armenia; All-Union Scientific Research Institute of Nature Protection and Nature Preserves, USSR Ministry of Agriculture

[Abstract] Investigations were conducted on the use of magnetic fields (MF) for the modification of the biological effects of X-irradiation, using Bezostaya-1 soft wheat. Evaluation of pre- and post-treatment with MF (15,000 gauss, 3-9 min) of irradiated (5-20 kr, 415 r/min) seeds in terms of shoot and rootlet growth showed that use of MF in the pretreatment mode exerted an inhibitory effect, whereas post-treatment with MF had a marked protective effect against the effects of X-irradiation. Furthermore, the effects of combined MF and X-irradiation treatment were not simply predicated on the radiation dose, but also dependent on the strength of the MF. These observations indicate that a homogeneous MF can be used to modify the effect of X-irradiation of biological objects. Figures 1; references 10:

6 Russian, 4 Western.

[413-12172]

UDC 577.391:661.879:611.24

RADIOBIOLOGICAL EFFECT OF  $\alpha$ -EMITTING RADIONUCLIDES INCORPORATED INTO LUNGS,  
PART 1. PULMONARY MICRODISTRIBUTION OF THORIUM-232-CONTAINING INSOLUBLE DUST

Moscow RADIOPHYSICS in Russian Vol 22, No 3, May-Jun 82  
(manuscript received 26 Nov 80) pp 369-372

KUT'KOV, V. A., IVANOV, V. I., BURYKINA, L. N., YEVLOVSKAYA, L. T.,  
MAKEYEVA, L. G. and PAVLOVSKAYA, N. A., Moscow Engineering Physical  
Institute, Scientific Research Institute of Labor Hygiene and Occupational  
Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] Pulmonary distribution patterns of insoluble  $^{232}\text{ThO}_2$  dust were investigated on outbred female rats following intratracheal administration (50 mg) or long-term inhalation ( $153 \text{ mg/m}^3$ , 5 h/day, 12 months). Examination of H/E stained sections of the lungs (200 nonoverlapping field of view/section) revealed homogeneously distributed areas of particle accumulation (conglomeration); calculations yielded  $3.4 + 0.4 \times 10^6 \text{ cm}^{-3}$  conglomeration sites per lung, equivalent to one site per 3-5 alveoli. Figures 1; references 14: 9 Russian, 5 Western.

[442-12172]

UDC 577.391:547.963.3

EFFECTS OF ACTIVATORS OF cAMP ACCUMULATION ON INDIVIDUAL STEPS OF CELLULAR  
GENE EXPRESSION IN ANIMALS WITH ACUTE RADIATION SICKNESS, PART 3.  
COMPARATIVE STUDIES ON CHARACTERISTICS OF RNA SYNTHESIZED BY ISOLATED  
HEPATOCYTE AND SPLENOCYTE NUCLEI IN IRRADIATED RATS AND OTHER ANIMALS  
PRETREATED WITH SEROTONIN

Moscow RADIOPHYSICS in Russian Vol 22, No 3, May-Jun 82  
(manuscript received 19 Nov 80) pp 379-382

TSUDZEVICH, B. A., GALKINA, L. A. and KUCHERENKO, N. Ye., Biological  
Faculty, Kiev State University imeni T. G. Shevchenko

[Abstract] Hepatocyte and splenocyte nuclei were used in studies on the effects of serotonin pretreatment on the nature of RNA synthesized in animals with acute radiation sickness following X-irradiation (8 Gy). The effects of X-irradiation consisted of inhibition of transcription, processing, and release of RNA from the isolated nuclei (particularly of mRNA judging by the depression of poly-A-containing RNA). Induction of cAMP accumulation by serotonin (an established radioprotective agent) attenuated the consequence of irradiation in terms of RNA metabolism. Figures 1; references 10: 4 Russian, 6 Western.

[442-12172]

UDC 577.391:621.039.58

TREATMENT OF EXPERIMENTAL RADIATION SICKNESS WITH DYSENTERY DIVACCINE AND ITS EFFECT ON IMMUNE RESPONSE TO HETEROLOGOUS ANTIGEN

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 3, May-Jun 82  
(manuscript received 19 Dec 80) pp 395-398

TYURIN, Ye. A.

[Abstract] The effects of divaccine (Sh. flexneri and Sh. sonnei divalent vaccine) treatment of gamma-irradiated (300 r) and control (CBA x C57B1)F<sub>1</sub> mice and convalescent (800 r) hamsters on the antibody response to S. paratyphi B and sheep erythrocytes were evaluated serologically. The results demonstrated that treatment with the divaccine enhanced agglutinin formation against paratyphi B, but depressed the hemagglutinin response against the erythrocytes (a thymus-dependent antigen). Figures 2; references 10 (Russian).  
[442-12172]

UDC 577.391:001.572

MODELING POSTRADITION CELL RECOVERY AND EFFECTIVE DOSE DIMINUTION PRINCIPLE.  
PART 2. CELL RECOVERY MODEL UNDER ARBITRARY IRRADIATION CONDITIONS

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 3, May-Jun 82  
(manuscript received 15 Jul 80) pp 399-402

ANDREYEV, A. D., Institute of Plant Physiology, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Mathematical models were constructed to account for the reduction in effective radiation dose consequent to postradiation cellular repair mechanisms. The present study expanded the model covering a single acute dose to fit low-level chronic irradiation, fractionated dose studies, prolonged exposure, dose variation, etc. Figures 1; references 6 (Russian).  
[442-12172]

UDC 577.391

EQUIVALENT DOSES, DOSE RATES, AND CHRONIC EXPOSURE TIMES TO IONIZING RADIATION FOR DIFFERENT MAMMALS

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 3, May-Jun 82  
(manuscript received 9 Sep 80) pp 420-423

TYAZHELOVA, V. G., Institute of Biological Physics, USSR Academy of Sciences, Pushchino

[Abstract] Literature data were surveyed for a comparative evaluation of equivalent doses, dose rates, and chronic exposure times to ionizing radiation for the various stages of clinical, biochemical, and morphological sequelae in the hematologic, reproductive, and endocrine systems. Specifically, tables for equivalent exposure times, dose rates, and doses are provided for humans, dogs, and mice. References 9: 7 Russian, 2 Western.  
[442-12172]

UDC 577.391:612.382.82

MICRODOSIMETRIC CHARACTERIZATION OF SOURCES OF MONOENERGETIC NEUTRONS

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 3, May-Jun 82  
(manuscript received 10 Sep 80) pp 427-429

FARNAKEYEV, V. V., VIDENSKIY, V. G. and KOLPACHEV, A. G., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk

[Abstract] Description is provided of a proportional tissue-equivalent counter used to assess the distribution function of energy absorbed by a spherical tissue equivalent phantom 1.0  $\mu\text{m}$  in diameter as a result of irradiation with 0.35-6.1 MeV monoenergetic neutrons. Comparison of the experimental data with available calculated data showed agreement when the absorbed energy was greater than 10 keV. At lower energies the experimental data were greater than the calculated data since the latter neglected contributions by gamma-irradiation emitted by the neutron source and arising on interaction of the neutrons with the constituent atoms of the target tissue. Figures 3; references 13: 7 Russian, 6 Western.  
[442-12172]

EFFECTS OF ACTIVATORS OF cAMP ACCUMULATION ON INDIVIDUAL STEPS OF CELLULAR GENOME EXPRESSION IN ACUTE RADIATION INJURY, PART 4: EFFECTS OF CYTOSOL FACTORS REGULATING TRANSCRIPTION AND NUCLEAR RELEASE OF RNA AND OF RADIO-PROTECTIVE AGENT SEROTONIN IN IRRADIATED ANIMALS

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 19 Dec 80) pp 435-440

TSUDZEVICH, B. A., GALKINA, L. A. and KUCHERENKO, N. Ye., Kiev State University imeni T. G. Shevchenko

[Abstract] The effects of hepatic and splenic cytosols (105,000 g supernatant fraction) on RNA synthesis and release from isolated hepatocyte and splenocyte nuclei were investigated in a system employing irradiated (7.76 Gy) rats. Irradiation of the animals resulted in cytosol preparations that progressively lost their physiological effectiveness with the post-radiation time whereas pretreatment of the rats with serotonin prevented such deterioration. In vitro exposure of the cytosol to trypsin or to 70°C for 15 min abolished its activity, indicating that the active factors in the cytosol were proteins. Irradiation of the animals apparently led to progressive inhibition of RNA synthesis and its release into the cytoplasm, which in turn depressed protein synthesis. Depressed levels of the cytosol protein factors evidently accounted for the lack of activity of the cytosol derived from irradiated animals because of interference with the fine control mechanisms between transcription and translation. Figures 2; references 15: 11 Russian, 4 Western.

[443-12172]

OXYGEN EFFECT AND CELLULAR ADAPTATION, PART 7: EXPERIMENTAL EVALUATION OF RADIOCHEMICAL AND METABOLIC OXYGEN UPTAKE ON RADIOPROTECTIVE EFFECTS OF ACUTE HYPOXIA IN IRRADIATED CELL SUSPENSION

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 27 Jan 81) pp 450-454

MESHCHERIKOVA, V. V., KOZIN, S. V. and VAYNSON, A. A., All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow

[Abstract] Evaluation of the survival curves of gamma irradiated (6-18 Gy) Chinese hamster cells showed that under hypoxic conditions (0.29 or 0.58%  $O_2 + 5\% CO_2$ ) radiochemical and metabolic oxygen consumption raised the  $D_0$  doses on the survival curves. However, the  $D_0$  values were not affected when irradiation was carried out in air or anoxic conditions. The radioprotective effects of acute hypoxia when radiochemical and metabolic oxygen uptake was inhibited were also affected in cells subjected to different background levels of oxygenation. The oxygen concentration at which cellular radiosusceptibility

was intermediate between that seen in air and anoxia was ca. 0.45% for cells with normal oxygenation, and 0.17% for chronically hypoxic cells. Such observations have clinical relevance for radiotherapy since the nonneoplastic cells possess a normal oxygen tension while tumors cells are relatively hypoxic. Figures 1; references 9: 4 Russian, 5 Western.  
[443-12172]

UDC 577.391:621.039.58

TRANSPORT CHARACTERISTICS AND RADIOPROTECTIVE ACTION OF METHYLATED HEMATOPORPHYRIN IN CELL CULTURE

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 16 Sep 80) pp 462-465

YARTSEV, Ye. I., NOVOSEL'TSEVA, S. D., SHKIRMAN, S. F., ARABEY, S. M., SOLOV'YEV, K. N. and PONOMAREV, G. V.

[Abstract] Accumulation of the dipotassium salt of 2,4( $\alpha$ -methoxyethyl)-deuteroporphyrin-IX (MDP) in asynchronous SOC cell culture was evaluated in relation to its radioprotective effectiveness. Addition of MDP to the culture 30 min before X-irradiation (6 Gy) increased cell survival rate to 42% (vs control 12%). Maximum survival (ca 70%) was obtained by the addition of MDP 8-9 h prior to irradiation. This also favored maximum accumulation of MDP in the cells (ca 1.3  $\mu$ g/g) for the 8 day period of observation and correlated with the duration of the high survival rate, although ca 20% of MDP was lost from the cells after 12 h and continued to decline to ca 1.0  $\mu$ g/g by day 8. Figures 3; references 13: 6 Russian, 7 Western.  
[443-12172]

UDC 577.391:539.125.5

NEUTRON AND  $\gamma$ -RADIATION INDUCED PROTOTROPHIC REVERTANTS IN ESCHERICHIA COLI

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript submitted 17 Mar 81) pp 466-469

SOKOLOV, V. A., MYASNIK, M. N. and KAPCHIGASHEV, S. P., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Odninsk

[Abstract] The lethal and mutagenic effects of neutron and  $\gamma$ -radiation were investigated on E. coli WP2 trp<sup>-</sup> auxotrophic mutants. Both forms of radiation were effective in inducing mutations responsible for reversion to trp<sup>+</sup> prototrophs; the frequency of reversions was equivalent at equal doses of gamma and neutron radiation, but the survival rate with neutron irradiation was significantly lower. At the 10% survival level the frequency of revertants with neutron radiation was 4-8% of the revertant frequency obtained with gamma radiation. This fact indicates the low efficiency of neutrons in

inducing point mutations, which may at least in part have been due to intrinsic gamma radiation. Figures 2; references 25: 8 Russian, 17 Western. [443-12172]

UDC 577.391:612.419:611.438

BONE MARROW AND THYMIC EFFECTS OF RADIATION COMBINED WITH THERMAL INJURY OR BONE FRACTURE

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript submitted 26 Mar 81) pp 483-487

PECHENINA, N. A., RYABCHENKO, N. I. and BRITUN, A. I., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk

[Abstract] Cellular dynamics and deoxyribonucleoprotein (DNP) degradation were investigated in the thymus and bone marrow of Wistar rats subjected to  $^{60}\text{Co}$  gamma irradiation (1-9 Gy), alone or in combination with thermal injury (covering 20% of body surface) or femoral fracture. The thymic and marrow hypocellularity evident 3 days after irradiation was not significantly affected by the thermal injury or bone fracture. However, DNP degradation was enhanced, suggesting that the additional traumatic factors altered the physiological condition of the seemingly unaffected residual cells. Figures 2; references 10 (Russian).

[443-12172]

UDC 577.391:001.572:612.112,94

MATHEMATICAL MODELS FOR POSTRADIATION LYMPHOPOIESIS

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 5 Oct 80) pp 488-493

SMIRNOVA, O. A., GOVORUN, R. D. and RYZHOV, N. I.

[Abstract] A mathematical model was developed for the inhibition and recovery of lymphopoiesis following irradiation, which consists of a system of nonlinear differential equations for the concentrations of the damaged and undamaged peripheral lymphocytes and their precursors in the bone marrow. Application of this model to experimental data on gamma irradiated (1-10 Gy) rats showed that this approach can provide qualitative, and in some cases quantitative, information on cellular depletion and repopulation of the thymus and bone marrow. Figures 4; references 12: 11 Russian, 1 Western.  
[443-12172]

UDC 577.391:621.039.58

RADIOPROTECTIVE EFFECTIVENESS OF CYSTAMINE ON INTRAMUSCULAR  
ADMINISTRATION TO MICE

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 17 Sep 80) pp 517-519

KUNA, P., Medical Scientific Research Institute imeni J. E. Purkjne,  
Hradec Kralove, CSSR

[Abstract] A comparative study was conducted on the radioprotectiveness and toxicity of cystamine on intraperitoneal and intramuscular administration to outbred mice (150 or 175 mg/kg). No significant differences were evident in the level of induced radioprotection or toxicity when cystamine was administered by either route, suggesting that the intramuscular route should be evaluated in other animals species. Figures 2; references 3; 2 Russian, 1 Czech.  
[443-12172]

UDC 577.391

EFFECTS OF HYPOXIC RADIOSENSITIZERS ON SURVIVAL AND COLONIAL MORPHOLOGY OF  
WILD TYPE AND RADIOSENSITIVE MICROCOCCUS RADIODURANS MUTANTS

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 14 Jul 81) pp 536-538

GROSHEV, V. V. and KUDRYASHOVA, N. Yu., Biological Faculty, Moscow State  
University imeni M. V. Lomonosov

[Abstract] Effects of membrane-acting agents (Aminazin and Novocain) and metronidazole (acts on recombination mechanisms) were evaluated on X-irradiated wild type Micrococcus radiodurans and rec-30 and uvs-17 mutants. All three agents sensitized the wild type and mutant uvs-17 to ionizing radiation (leading to a reduction in the survival rate), but had no effect on mutant rec-30. Similarly, these agents induced significant changes in colonial morphology only in the uvs-17 mutant. These observations indicate that these agents, which differ in their mechanisms of action, specifically inhibit recombination repair of ionizing radiation-damaged DNA and that their combination with ionizing radiation induces both radiosensitization and abnormalities in cell division. Since the rec-30 cells formed only 'normal' colonies following exposure to these agents, the effects of cell division cannot be ascribed solely to a pleiotropic mechanism in the disruption in the cell membrane. Figures 1; references 15 (Western).  
[443-12172]

UDC 577.391:591:434.612.419

RADIOSENSITIVITY OF ANIMALS IRRADIATED IN MODIFIED GASEOUS ENVIRONMENT,  
PART 4: EFFECTS OF BREATHING NORMOBARIC PURE OXYGEN ON PROLIFERATIVE  
ACTIVITY OF HEMATOPOIETIC TISSUE AND DUODENAL EPITHELIUM

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 18 Nov 80) pp 539-541

VASIN, M. V., L'VOVA, T. S. and KOROLEVA, L. V.

[Abstract] Depression of bone marrow mitotic activity (63.2-74.3 mitotic index) for 6 h was observed in (CBA x C57Bl)F<sub>1</sub> mice after breathing normobaric pure oxygen for 20 min, followed by a phase of enhanced mitotic activity (116.3-136.5 mitotic index) for 2-6 days after the exposure to pure oxygen. The proliferative activity of the duodenal epithelium was not affected by the inhalation of pure oxygen. The eventual elevation of the mitotic activity in the bone marrow was presumably due to partial synchronization of cell division in that tissue. Figures 1; references 13: 6 Russian, 7 Western.  
[443-12172]

UDC 577.391:621.039.58:612,273

HYPOXIC GAS MIXTURE IN EMBRYO RADIOPROTECTION

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 28 Jan 81) pp 542-544

PALYGA, G. F., STRELKOV, R. B., PARTSKHALADZE, N. N., LAGODA, T. S. and EPATOVA, T. V., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk; Institute of Physiology, Georgian SSR Academy of Sciences, Tbilisi

[Abstract] In utero and post-partum survival of rat pups was investigated in the case of pregnant Wistar rats irradiated (<sup>60</sup>Co gamma rays, 2 Gy) during the first (Group I) or second (Group II) half of gestation while breathing a hypoxic gas mixture (10% oxygen + 90% nitrogen, HGM-10) for 15 min (commencing 5 min before irradiation). In group I, 1.9% of the pups were stillborn (vs 91.3% in control irradiated but unprotected females), while 96.2% survived to the 30th post-partum day (vs 2.2% for the control rats). In group II the respective figures were 2.3% (2.7% control) and 90.7% (79.7% control). These observations confirm the efficacy of HGM in protecting rat embryos and fetuses against the consequences of irradiation, and the much more deleterious effects of irradiation during the first half of gestation. References 12 (Russian).

[443-12172]

UDC 577.391:621.039.58

ROLE OF ENDOGENOUS SUBSTANCES IN ENHANCING RADIRESISTANCE, PART 13:  
EFFECTS OF CERTAIN RADIOPROTECTORS ON LIPID PEROXIDATION

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 16 Jun 81) pp 548-551

GUROVICH, A. V., PLATONOV, A. G., DEYEV, L. I. and KUDRYASHOV, Yu. B.,  
Biological Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] In vivo and in vitro studies were conducted on the effects of serotonin and AET on lipid peroxidation in outbred rats. Within 15 min of administration (time of maximum radioprotection) serotonin induced significant depression of free fatty acid hydroperoxides in the liver, spleen, and small intestine mucosa, while AET had a similar effect only in the liver. Phospholipid hydroperoxide levels were unaffected. However, in vitro incubation of hepatic microsomes with serotonin or AET led to depression of phospholipid hydroperoxides without affecting free fatty acid hydroperoxides, presumably because of the elimination of phospholipase A<sub>2</sub> during microsome isolation. References 16: 10 Russian, 6 Western.

[443-12172]

UDC 577.391:621.039.58

INCREASED TOLERANCE OF STATIC LOAD IN RATS PROTECTED BY HYPOTHOXIC GAS  
MIXTURE DURING IRRADIATION

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 17 Mar 81) pp 551-553

STRELKOV, R. B., KUCHERENKO, N. G. and SHOLOKHOV, V. A., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Ochninsk

[Abstract] Physical fatigue as an indicator of the radioprotective effectiveness of GGS-10 (hypoxic gas mixture, HGM) was investigated on irradiated Wistar rats. Over a 30 day period unirradiated control rats showed an increase in the duration of time for which they were able to cling to a vertical rotating pole which reached a plateau at 17 days; irradiated (5.5 Gy, gamma rays) control rats also reached a plateau at 17 days but throughout the 30 day period their times were significantly shorter. For 20 days the clinging time for the experimental rats (irradiation + HGM) was intermediate between the two control groups, but at 20 days reached essentially the same maximum time as the unirradiated control rats. These observations indicate that physical fatigue can serve as an indicator of radioprotection in a situation where irradiation is insufficient to cause death within a 30 day period, and may be used in lieu of survival rate. Figures 1; references 4: 3 Russian, 1 Western.

[443-12172]

DISTRIBUTION AND BIOLOGICAL ACTIVITY OF TRITIUM OXIDE ON CHRONIC INTAKE

Moscow RADIOBIOLOGIYA in Russian Vol 22, No 4, Jul-Aug 82  
(manuscript received 12 Jan 81) pp 556-560

ZHURAVLEV, V. F., KALYAZINA, N. S. and KATSAPOV, I. S.

[Abstract] Effects of long-term tritium oxide intake were investigated on rats given tritium oxide per os with drinking water for six months ( $34.04 \times 10^3$  to  $10.84 \times 10^5$  Bq/ml, 20-25 ml consumed/day). As a result, tritium became incorporated into the structural elements of organs and tissues to a much greater extent than its concentration in the aqueous phase. Administration of  $27.38 \times 10^4$  to  $10.82 \times 10^5$  Bq/ml shortened the life span of the experimental animals, caused leukocytopenia, and increased the incidence of mammary cancer in the female rats by 9.5-11%. Extrapolation of the data to humans showed that the concentration of tritium oxide in the human body should not exceed  $4.45 \times 10^7$  Bq. Figures 1; references 4 (Russian).  
[443-12172]

VIROLOGY

UDC 578.832.1:578.5

PERSISTENCE OF EPIDEMIC INFLUENZA VIRUS (H1N1) GENES IN NATURAL POPULATIONS

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 2 Feb 82) pp 17-20

L'VOV, D. K., YAMNIKOVA, S. S., SHEMYAKIN, I. G., AGAFONOVA, L. V., MYASNIKOVA, I. A., VLADIMIRTSEVA, Ye. A., NIMEDAVA, P., DASHTSEREN, P., BEL-OCHIR, Zh. and ZHDANOV, V. M., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Sciences, Moscow; State Institute of Hygiene, Epidemiology, and Microbiology, Mongolian Peoples Republic Ministry of Health; Scientific Research Institute of Animal Husbandry and Veterinary Medicine imeni Zh. Sambu, Mongolian Peoples Republic Ministry of Agriculture, Ulan-Bator

[Abstract] Hemagglutination inhibition and neuraminidase inhibition serology was conducted to determine the relationship among influenza H1N1 viruses isolated from humans and wild and domestic animals in Mongolia and the USSR during 1977-1980, and for comparison with isolates obtained in 1947 and 1957. Despite considerable serologic similarity among the influenza A viruses, the Mongolian isolates obtained in 1979-1980 showed antigenic drift in neuraminidase. Furthermore, RNA electrophoretic analysis and RNA-RNA hybridization experiments demonstrated the Mongolian isolates to be quite close to each other but distinct from influenza A/USSR/90/77 isolate. On the basis of the isolates obtained from different species, the distribution in nature appears to follow the human-domestic birds-wild birds-mammals pattern. Figures 2; references 12: 6 Russian, 6 Western.

[2-12172]

UDC 616.832-002-022:578.833.26]-078:578.72

PERSISTENCE OF TICK-BORNE ENCEPHALITIS VIRUS IN M. RHESUS MONKEYS WITH EXPERIMENTAL ALLERGIC ENCEPHALOMYELITIS

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 29 Oct 81) pp 25-30

POGODINA, V. V., RAVKINA, L. I., MALENKO, G. V., FOKINA, G. I., BOCHKHOVA, N. G., LEVINA, L. S. and FROLOVA, M. P., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Sciences, Moscow

[Abstract] M. rhesus monkeys were injected subcutaneously with tick-borne encephalitis virus (TBEV) and subsequently (at 1.5, 8.5, 10.5 months) challenged with an encephalitogenic mixture (EM) to study TBEV persistence in the face of experimental allergic encephalomyelitis (EAE). TBEV injection resulted in asymptomatic infection accompanied by low levels of serum neutralizing, complement fixing, and hemagglutinating antibodies. EM challenge led to clinically typical EAE confirmed by histopathological studies, which was either accompanied by elevation of all the species of anti-TBEV antibodies or only of the neutralizing antibodies. Ten months after TBEV injection the virus could not be isolated from the organs and tissues; however, TBEV was isolated as late as 39 months in animals challenged with EM. These observations suggest that EAE and perhaps other autoimmune processes in the CNS may serve as a factor favoring asymptomatic persistence of TBEV.

Figures 4; references 11; 7 Russian, 4 Western.  
[2-12172]

UDC 578.832.1.04:615.281.8

RAPID PRODUCTION AND CHARACTERIZATION OF INFLUENZA A VIRUS VARIANTS RESISTANT TO AMANTADINE AND REMANTADINE

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 9 Jun 81) pp 42-47

VLADYKO, A. S., SHOBUKHOV, V. M., LINITSKAYA, G. L. and GALEGOV, G. A., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Chick embryo fibroblast cultures were used for the rapid selection of amantadine- and remantadine-resistant variants of influenza A virus. Initially, the virus was passed under a liquid overlay containing the agents in a one cycle experiment, followed by plaque identification of resistant viruses under an agar overlay containing either antiviral agent in nontoxic concentration. The resultant number of amantadine-resistant variants was significantly greater than the number resistant to remantadine. Cross resistance studies showed that amantadine inhibited reproduction of

remantadine-resistant virus and, by more than 50%, the induction of RNA-dependent RNA polymerase by the remantadine-resistant virus. However, the induction of virus specific RNA-dependent RNA polymerase by the amantadine-resistant virus was virtually unaffected by remantadine. Figures 5; references 20: 8 Russian, 12 Western.

[2-12172]

UDC 616.98;578.832.1]-085.281.8:615.451.35]-036.8-07

#### EFFECTIVENESS OF AEROSOL COMBINATION OF REMANTADINE AND RIBAMIDE AGAINST EXPERIMENTAL INFLUENZA IN WHITE MICE

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 26 Oct 81) pp 56-59

PETROVA, I. G., BALASHOV, V. I., PUSHKARSKAYA, N. L., TERSKIKH, I. I., LIDAK, M. Yu., and GALEGOV, G. A., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Efficacy of aerosol preparations of remantadine and ribamide (ribavirin) in preventing and treating experimental influenza A/Aichi/2/68 (H3N2) in outbred white mice was evaluated in terms of survival statistics. When applied 8 h before infection and continued for 8-9 more daily applications of the remantadine (40 mg/kg/dose) and ribamide (40 mg/kg/dose) aerosols prolonged survival time and protected, respectively, 44 and 57% of the animals from death (vs. 75-80% mortality in untreated control mice). Combined aerosols (80 mg/kg) were not noticeably more effective. Application of the same dose 24 h after infection followed by 8 more daily applications protected 21% of the remantadine animals from death and 24% of the ribamide-treated animals. Aerosol combination was effective in protecting 40% of the animals from death (vs. ca. 90% mortality of untreated animals). Use of the aerosols had no adverse effects on the animals and suggest that this route could be utilized in clinical trials. Figures 3; references 13: 3 Russian, 10 Western.

[2-12172]

UDC 578.832.1:[578.56:578.72

#### VARIABILITY IN VIRULENCE OF RECOMBINANT INFLUENZA A VIRUSES

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 9 Jul 81) pp 65-68

ZAZIMKO, L. A., VAKIN, V. S., KOZINETS, I. A. and ZAKHAROVA, N. G., All-Union Influenza Scientific Research Institute, USSR Ministry of Health, Leningrad

[Abstract] Human volunteers were employed to assess the virulence of recombinant influenza A viruses obtained by cross-reactivation of UV-irradiated

virus or by simultaneous cultivation of two viruses, using strains isolated during epidemics and viruses areactogenic for humans (influenza A/Brazil/11/78 (H1N1), A/USSR/382/78 (H3N2), A/Texas/1/77 (H3N2), and attenuated variants A/Leningrad/9/46 (HON1) and A/Victoria/35/72 (H3N2)). The variety of recombinants obtained varied in reactogenicity, which at times exceeded that of the epidemic strains, while certain recombinants with surface antigens of the epidemic strains were innocuous on intranasal administration and showed remantadine sensitivity of the areactogenic parental strain. References 4 (Western).

[2-12172]

UDC 578.832.1.04:578.242.42

#### EFFECTS OF PROTEASE INHIBITORS ON INFLUENZA VIRUS REPRODUCTION

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 16 Jul 81) pp 68-71

KANTOROVICH-PROKUDINA, Ye. N., SEMENOVA, N. P., BEREZINA, O. N. and MOSOLOV, V. V., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences; Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow

[Abstract] A chick embryo system was used to evaluate the effects of various trypsin inhibitors (derived from soybean, potato, beans, honey locust (*Gleditsia triacanthos*)) on the reproduction of influenza A (HON1) (WSN) virus, in view of the correlation between post-translational splitting of hemagglutinin into two subunits and viral reproduction. The results showed that, in terms of the reduction in plaque formation, the potato preparation was most effective in inhibiting viral reproduction and trypsin activity, while the bean extract was least effective in terms of both parameters. Figures 2; references 10: 4 Russian, 6 Western.

[2-12172]

UDC 578.833.26:578.72+615.371:578.833.26].015.46.076.9

#### USE OF INBRED MICE IN EVALUATION OF NEUROVIRULENCE OF TICK-BORNE ENCEPHALITIS VIRUS COMPLEX AND IMMUNOGENICITY OF VACCINE

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 27 Jul 81) pp 77-80

KAN, G. A., BORSUK, E. A. and VOROB'YEVA, M. S., State Institute of Standardization and Control of Medical Biological Preparations imeni L. A. Tarasevich, USSR Ministry of Health

[Abstract] Various lines of inbred mice were tested for susceptibility to several strains of tick-borne encephalitis virus (TBEV), and for evaluation

of inactivated TBEV vaccine. On intracerebral inoculation the virulent and attenuated TBEV evoked similar titers in the different mouse lines. However, subcutaneous administration of TBEV evoked variable responses depending on viral strain and mouse line. BaLB/c mice and their hybrids were most resistant to subcutaneous inoculation with attenuated TBEV (Elantsev and E-30), while CBA mice were most susceptible; the latter mouse line also required considerably greater minimum immunizing dose of the inactivated vaccine for protection than the BaLB/c line. References 6: 5 Russian, 1 Western.  
[2-12172]

UDC 616.98:578.833.26]-036.1-092.9-078;578.72

CHARACTERISTICS OF PERSISTING TICK-BORNE ENCEPHALITIS VIRUSES IN DIFFERENT FORMS OF CHRONIC ENCEPHALITIS IN ANIMALS

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 8 Jul 81) pp 89-95

FROLOVA, T. V., POGODINA, V. V., FROLOVA, M. P. and KARMSHEVA, V. Ya., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Investigations were conducted on the variations induced in Vasil'chenko tick-borne encephalitis virus (TBEV) following chronic persistence in Macaca rhesus monkeys for 383 days (TBEV V-383), followed by an additional 70 (V-453) or 152 (V-535) days in the Syrian hamster. V-383 was found to be much more pathogenic for hamsters and outbred white mice than the Vasil'chenko virus and possessed greater thermal stability. Differences between the two strains were also evident on evaluation of CPE in tissue culture. Nevertheless, no differences were detectable by CF and neutralization serologies. V-453 led to the development of CPE in tissue culture but was nonpathogenic for white mice, while V-535 was highly pathogenic for mice. Figures 8; references 15: 13 Russian, 2 Western.  
[2-12172]

UDC 616.98:578.833.26]-022.14-092.9

MOUSE MODELS OF MIXED INFECTIONS WITH TICK-BORNE ENCEPHALITIS AND  
POWASSAN VIRUSES

Moscow VOPROSY VIRUSOLOGII in Russian Vol 27, No 4, Jul-Aug 82  
(manuscript received 21 Oct 81) pp 107-111

KHOZINSKAYA, G. A. and POGODINA, V. V., Institute of Poliomyelitis and  
Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Mixed infections with tick-borne encephalitis virus (TBEV) and Powassan virus (PV) were evaluated in outbred white mice infected by different routes and different combinations of the viruses. Generally, the viruses multiplied independently and hemagglutinins were formed against each species. In adolescent mice with combined subcutaneous inoculation with highly virulent PV and a TBEV with low peripheral activity the progression of disease was severe with elevated mortality. Injection of the viruses at 2-3 week intervals led to establishment of cross-immunity with very low hemagglutination titers, if any, against the superinfecting virus and without an anamnestic response to the first virus. In addition, passive immunity against the heterologous virus could not be transferred by serum.

References 15: 8 Russian, 7 Western.

[2-12172]

CSO: 1840

- END -